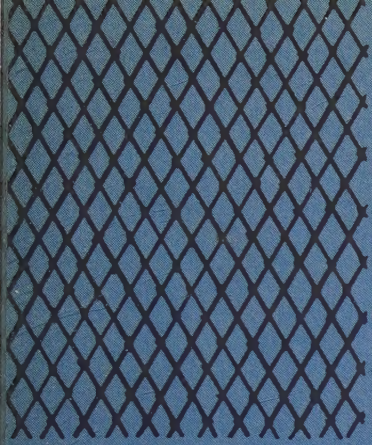

EPORT OF THE

BUREAU OF COMMERCIAL FISHERIES

FOR THE CALENDAR YEAR 1969

United States Department of the Interior
U.S. Fish and Wildlife Service
Bureau of Commercial Fisheries

ANNUAL REPORTS

Leslie W. Scattergood, *Editor*

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Annual reports review briefly the principal efforts of the Bureau of Commercial Fisheries to help the U.S. fishing industry maintain the position of the United States as one of the world's leading fishing nations.

On October 2, 1970, the Bureau of Commercial Fisheries was transferred to the Department of Commerce and renamed National Marine Fisheries Service.

UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

REPORT OF THE

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CALENDAR YEAR 1969

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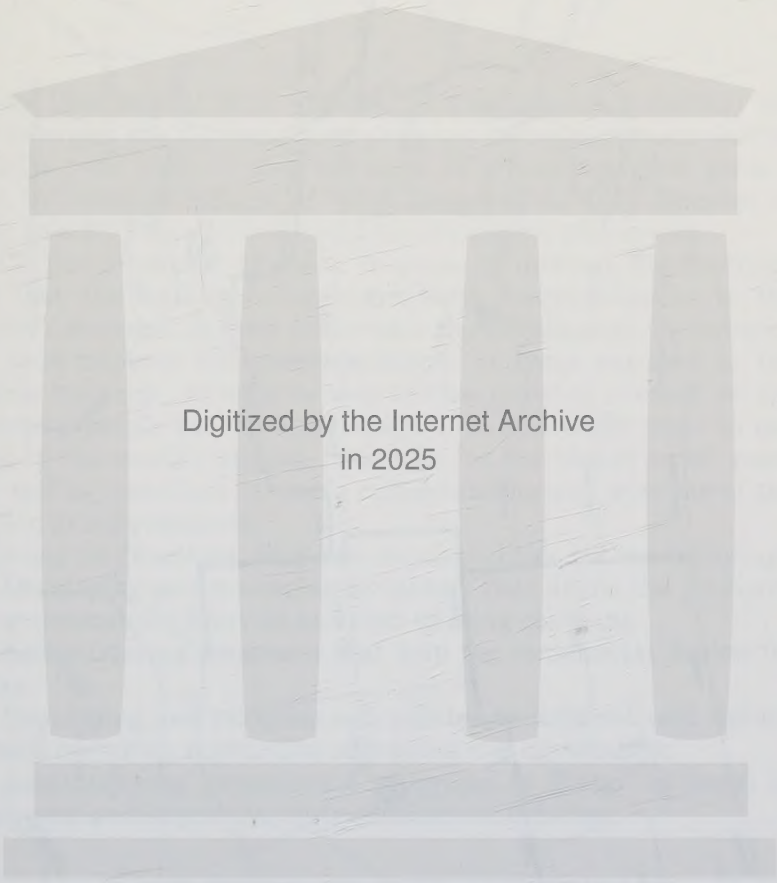

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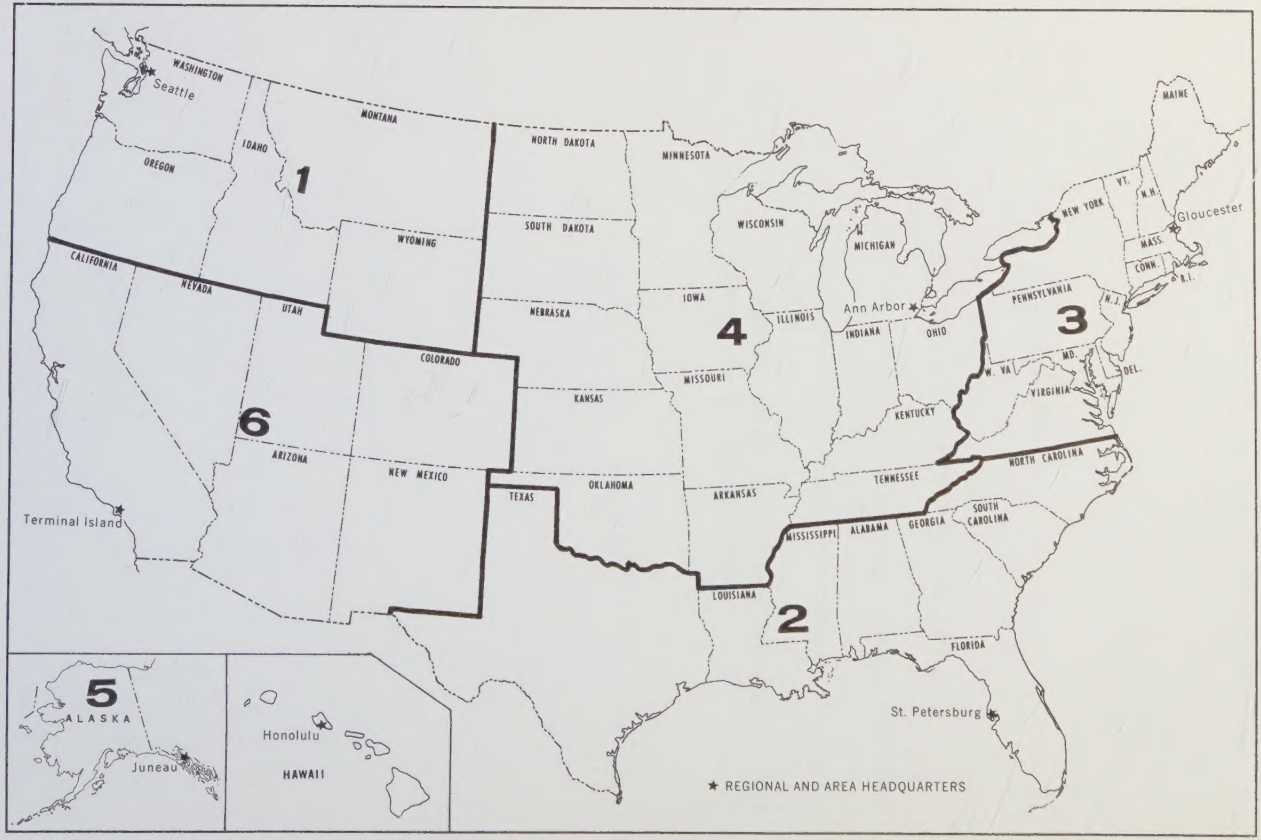


Frontispiece.—Regional and Area boundaries, Bureau of Commercial Fisheries, December 31, 1969.

Report of the Bureau of Commercial Fisheries for the Calendar Year 1969

This 13th annual BCF (Bureau of Commercial Fisheries) report provides the highlights and principal accomplishments during calendar year 1969. It also functions as a document that gives a brief but concise history of what happened to U.S. fisheries in 1969, how BCF functioned, and what changes it underwent.

BCF has a number of goals. It works to increase the contribution that the aquatic living commercial resources make to the Nation's economy. It aims to increase the efficiency of the fisheries and thus improve the economic status of those engaged in the fishing industry. It tries to help fill the growing demand of the American people for fish and shellfish. It also seeks ways to use more of the world's aquatic resources for the benefit of all mankind and to contribute to man's understanding and wise use of the aquatic living resources.

Among its functions, BCF has responsibilities for the following:

- Developing and managing programs that define the problems of the commercial fisheries and then offering solutions.
- Administering programs that help the commercial fishing industry.
- Developing and carrying out policies on international fishery matters including negotiation of treaties and agreements.
- Administering grant-in-aid programs to States to assist in developing and improving their commercial fisheries.

CONDITION OF THE FISHERIES

U.S. fishermen caught 4,292 million pounds of fish and shellfish in 1969 that sold for $518 million—the highest value in our history. The value of the catch was $47 million more than in 1968 and 31 percent above the previous 10-year average. The volume taken was 176.4 million pounds or about 4 percent more than in

1968 and the largest catch since 1966. Among the leading fishing nations of the world, the United States ranked fifth in 1969 in terms of quantity after Peru, Japan, the U.S.S.R., and China (mainland).

There were record landings of Gulf menhaden, Pacific anchovies, yellowfin tuna, dungeness crabs, tanner crabs, shrimp, spiny lobsters, and surf clams in 1969; and sharp increases in the catches of Atlantic cod, Pacific halibut, and blue crabs. Landings of Atlantic flounders, pollock, and soft clams were also higher in 1969 than in 1968. However, on the other side of the ledger, there were declines in landings of haddock, Atlantic sea herring, Pacific salmon, whiting, otter-trawl-caught industrial fish, sea scallop meats, and king crab. Production of jack mackerel, Atlantic ocean perch, and oyster meats was also below the 1968 levels.

Fishermen were paid a record-high average of 12.08 cents per pound for the large 1969 catch—well above the 11.46 cents paid in 1968 and 10.84 cents paid in 1967. Average prices of many fishery items increased substantially in 1969. The smaller 1969 whiting catch (down 41 percent) actually gave fishermen as much money as did the large 1968 catch. Average prices paid in most of the other fisheries that had lower landings than in 1968 also increased until the total exvessel value paid was nearly equal to that received for the larger 1968 catches.

The 1969 value of fishery products that were processed in this country from both domestic and imported raw material was $1.5 billion—about 6 percent above that of 1968. The canned pack of 40.3 million standard cases was valued at $580.8 million—just slightly below the record 1968 value of $583.9 million. About the same amount of canned tuna was produced as in the previous year, whereas the packs of crab meat, shrimp, and clam products were larger. Industrial products increased $14.5 million. The remarkable fish stick and portion industry continued to set new volume and value records—production was 329.8 million pounds valued at $134.7 million. Processors of breaded shrimp produced 104.6 million pounds (just short of breaking the 1966 record production of 104.9 million pounds) valued at a new high of $110.5 million. Production of fillets and steaks in both volume and value increased. Fish and shellfish specialty dinners and other packaged fish and shellfish products increased in volume in 1969 and were valued at over $438 million—3 percent above the 1968 level. Exports of domestically produced fishery products were worth a record $104.5 million—a gain of $36.8 million—while imports also reached a new high of $844.3 million.

At year end, some segments of the industry were harvesting fishery resources that had decreased because of both natural causes and heavy fishing; other segments were using resources that enabled them to be highly competitive with foreign fleets and production. With few exceptions, prices for fishery products generally increased at all levels: exvessel, wholesale, and retail. Fishermen got a high exvessel value in 1969, and the fish-processing industry generally made excellent gains in production. Many canned items, fish sticks and portions, fillets and steaks, shellfish (crabs, lobsters, and shrimp) products, and other fish and shellfish products were in good demand throughout 1969, and many of these items were being shipped to foreign countries in increasing quantities. Civilian per capita consumption of edible fishery products in the United States increased from 11.0 pounds of edible meat in 1968 to 11.1 pounds in 1969—the highest since 1954.

DEVELOPMENTS IN THE FISHERIES

In 1969, certain segments of the domestic fisheries made considerable progress, important Federal legislation affecting fisheries attracted attention, and international fishery matters continued to concern BCF.

Domestic Fisheries

The important developments in the domestic fisheries in 1969 include greater catches of shrimp from Alaska waters, an emerging Alaska fishery for tanner crabs, a year-round fishery for calico scallops off Florida's east coast, and increased interest in expanding the shrimp fishery of New England.

Alaska Shrimp Fishery

The Alaska shrimp fishery is primarily for the cocktail-size pink shrimp within fishing distances from Kodiak Island. Other species being harvested include spot shrimp (prawn size), sidestripe shrimp (medium size), and humpy shrimp (cocktail shrimp). Using beam trawls, conventional shrimp trawls, and pots, U.S. fishermen in 1969 harvested an estimated 45 million pounds of shrimp from Alaska waters. BCF estimates that the U.S. catch of Alaska shrimp in 1968 was 42,077,000 pounds.

Kodiak Island currently is the center of the Alaska shrimp trawl fishery; however, shrimp are caught also in several other areas of Alaska including Cook Inlet, Prince William Sound, and southeastern Alaska.

Alaska Tanner Crab Fishery

The Alaska fishery for tanner crabs, which is centered mainly in the Gulf of Alaska with principal landings at Kodiak, is a developing fishery. U.S. fishermen have landed these crabs since 1951, but until recently the landings were sporadic and generally minor compared to recent years. Landings have increased rapidly from 118,400 pounds in 1967 to an estimated 10 million pounds in 1969.

Florida Calico Scallop Fishery

In 1969, the fishery for calico scallops off Florida's east coast for the first time became a year-round operation. Three vessels capable of processing calico scallops at sea fished throughout 1969. Processed scallops were landed in Florida ports, including Cape Canaveral and St. Augustine, and at Brunswick, Ga. Individual vessels had record landings of 14,000 to 20,000 pounds of processed scallop meats per 5-day trip. As expected, two of the scallop-processing vessels had some initial trouble with prototype onboard processing machinery; however, by the end of 1969 the problems were eliminated. Two new shore-based scallop-processing plants were under construction by the end of 1969, one at Cape Kennedy, Fla., and the other at Apalachicola, Fla. The latter plant, which will be on Florida's west coast, will handle scallops from the Gulf of Mexico.

New England Shrimp Fishery

Interest in expanding the shrimp fishery of New England increased during 1969. The fishery was formerly centered at Portland, Maine, and most of the fishing was between Casco and Muscongus Bays. Now Gloucester, Mass., has established shrimp-processing facilities and is competing with Portland. Annual landings have steadily increased from slightly over 2 million pounds in 1965 to an estimated 26 million pounds in 1969. At the end of 1969, a new processing plant was being constructed on Gloucester's State Pier. It was designed to handle up to 200,000 pounds of shrimp per day. This facility is large enough to provide employment for about 100 persons in the cooking and freezing plant and 12 to 15 in the office.

Federal Legislation

During 1969, the 91st Congress, 1st Session, introduced numerous bills that related to fisheries. It enacted only one bill, however,

that directly concerns commercial fisheries. See appendix B for detailed information and citations.

The bill (H.R. 11363), which when enacted became the "Endangered Species Conservation Act of 1969" (Public Law 91–135), also contained sections that amended the Black Bass Act and the Lacey Act. The amendments to these latter two acts are of particular interest to commercial fisheries.

Black Bass Act

The Black Bass Act prohibited transportation in interstate or foreign commerce of black bass or other fish if taken contrary to the law of the State, territory, or the District of Columbia, in which it was taken. As amended by Public Law 91–135, the prohibition has been extended to the importation of fish taken contrary to the laws of a foreign country.

Lacey Act

The amendment to the Lacey Act added mollusks and Crustacea to the definition of "wildlife" so that these animals are included in the prohibition against transportation in interstate or foreign commerce if taken in violation of Federal or State laws or regulations or laws or regulations of a foreign country.

International Developments

Developments in foreign fisheries increasingly affect the fishing industry and fishery policy of the United States. To assist and protect the fisheries, the United States negotiated with U.S.S.R. a 2-year extension of three bilateral agreements relating to their fisheries off the coasts of the United States and signed a 1-year agreement with Poland on mid-Atlantic fisheries. BCF also developed and expanded overseas markets for U.S. fishery products. BCF continued to have an active and leading role in activities of international fishery commissions and at international meetings sponsored by the Food and Agriculture Organization of the United Nations and affiliated organizations. BCF also obtained information needed to determine how fishing activities and developments affect the U.S. fishing industry and U.S. Government programs and policies. In cooperation with the U.S. Coast Guard, BCF maintains enforcement and surveillance operations to ensure that domestic and foreign fishing vessels observe various international agreements.

Developments in Foreign Fisheries

In 1969, the world fisheries catch suffered a mild setback for the

first time since 1950. According to preliminary reports from the Food and Agriculture Organization of the United Nations, the world catch dropped from 141.1 billion pounds in 1968 to about 137.0 billion pounds in 1969. The decline was mainly due to smaller catches of fish used for fish meal and oil. In quantity caught, Peru led all other nations, followed by Japan, U.S.S.R., China (mainland), United States, and Norway. Nearly 60 percent of the annual world catch is taken by these six countries.

In January 1969, the United States negotiated a 2-year extension of three bilateral agreements with the U.S.S.R. These agreements are on (1) gear conflict in the Kodiak Islands area, (2) king and tanner crabs, and (3) fishing in the contiguous fisheries zone in the Northeastern Pacific including the eastern Bering Sea.

The Kodiak Gear Agreement, initially concluded in December 1964, established six zones in waters adjacent to Kodiak where U.S.S.R. vessels were prohibited from trawling during certain periods to avoid damaging the fixed-pot fishing gear of United States king crab fishermen. This agreement was modified by changing the closure period and extending it an additional month to coincide with the king crab season established by the State of Alaska.

The Bering Sea king and tanner crab agreement was initially signed in February 1965. The United States considers king crabs and tanner crabs to be Continental Shelf fishery resources and claims sovereign rights over this resource. The United States, however, is permitting the U.S.S.R. to fish for these two species subject to specific limitations. The U.S.S.R. production of king crabs, which was limited to 118,600 cases (48 half-pound cases) annually in 1965 and 1966, was reduced to 100,000 cases for 1967 and 1968 at discussions in February 1967. During the 1969 negotiations, the U.S.S.R. quota was reduced drastically to 52,000 cases per year for 1969 and 1970 because the resource clearly showed signs of overfishing.

The Contiguous Fishery Zone Agreement was signed in February 1967 for a 1-year period and subsequently extended for another year. The law (Public Law 89–658) establishing the 9-mile exclusive fishery zone, which became effective in October 1966, permits continuation of foreign fishing in the zone as may be recognized by the United States. The new agreement provides improved protection for stocks of special concern to U.S. fishermen and includes special arrangements to reduce gear conflicts on the high seas.

On June 12, 1969, the United States and Poland signed a 1-year

agreement on mid-Atlantic fisheries. The agreement provides for cooperation in fishery research that will lead to a conservation program for those species being fished by either country off the U.S. mid-Atlantic coast. The agreement provides also for special measures to be taken by Poland to protect those species of fish of special concern to United States fishermen.

To conserve fluke, red hake, silver hake (whiting), and scup, Poland agreed to refrain from fishing in a particular area off the mid-Atlantic coast where those species concentrate during winter. In addition, Poland (whose fishermen have been fishing primarily for herring and mackerel) will not fish for fluke, red hake, silver hake, and scup throughout the mid-Atlantic and will take special precautions to avoid concentrations of groundfish during the entire year.

Polish fishermen, in return, are allowed to use three small areas along the mid-Atlantic coast within the 9-mile contiguous fishing zone of the United States for unloading and transferring their fish catch during winter and early spring.

Each government has agreed to allow a limited number of fishing and supply ships into certain ports of the other country. A limited number of Polish fishing and supply vessels are able to use port facilities in certain major ports of the mid-Atlantic (New York, Philadelphia, Norfolk, and Baltimore).

Foreign Trade Promotion

During 1969, BCF successfully continued its efforts to develop and expand overseas markets for U.S. fishery products. Its Office of International Trade Promotion represented the U.S. fishing industry at four major food trade fairs in Western European countries. These fairs were in Milan, Italy; Brussels, Belgium; Cologne, West Germany; and Basel, Switzerland. During 1969, 37 U.S. firms participated in the BCF foreign market development program. Of these, 12 were new participants that had some products that were exhibited for the first time in an overseas food trade fair. These products include frozen and canned tanner crabs, frozen crayfish, shrimp and crayfish entrees, live eels, live lobsters in a self-contained tank, fresh and frozen oysters in the shell, frozen oyster meats, and a line of canned concentrated chowders, bisques, canned clam fritters, and clam broth.

Western Europe enthusiastically received U.S. quality fishery products. Sales made during the four fairs were $280,000, and U.S. participating firms conservatively estimate that projected sales for the 12 months following will be $3,830,000.

International Meetings

The more important international meetings in 1969 involving BCF and its personnel were with the Food and Agriculture Organization of the United Nations, Great Lakes Fishery Commission, Inter-American Tropical Tuna Commission, International Commission for the Conservation of Atlantic Tunas, International Commission for the Northwest Atlantic Fisheries, International North Pacific Fisheries Commission, International Pacific Halibut Commission, International Pacific Salmon Fisheries Commission, International Whaling Commission, North Pacific Fur Seal Commission, and United Nations Industrial Development Organization.

Reporting on Foreign Operations

Because fishing activities by foreign countries change continually, BCF obtains information needed to assess the impact of these fishing activities and developments on the U.S. fishing industry and U.S. Government programs and policies. Fishery attachés in Denmark, Ivory Coast, Japan, and Mexico supplied the United States Government and the commercial fishing industry with news on fishery developments in their regions. Current information on the world's ever-changing fisheries provided a basis for many U.S. Government and industry decisions. Such reports are also used in international negotiations and in resolution of international fishery problems.

BCF continues to provide current reporting on the foreign fishing off U.S. coasts.

Treaty Enforcement and Foreign Fisheries Surveillance

BCF, with the assistance and cooperation of the U.S. Coast Guard, maintains enforcement and surveillance in Alaska, the Pacific Northwest, California, Puerto Rico, New England, and the mid-Atlantic area.

The program objectives are to:

1. Ensure that foreign fishing vessels follow the provisions of various international agreements as well as observe the contiguous fisheries zone (12 miles) and territorial waters.

2. Enforce domestic fisheries regulations adopted in conjunction with international treaties (Pacific halibut, eastern Pacific yellowfin tuna, International Convention for the Northwest Atlantic Fisheries, and the Fraser River pink and sockeye salmon).

3. Provide the intelligence information that is needed for future negotiations regarding foreign fishing off the United States.

BCF and the Coast Guard cooperatively patrol about 330,000 air miles and 120,000 vessel miles each year. In addition, each year BCF agents make about 1,500 dockside inspections to enforce domestic regulations adopted in conjunction with international treaties.

Program highlights during 1969 included apprehension of three Japanese vessels for illegal fishing in United States waters and seizure of two Japanese vessels for violating the abstention agreement of the International North Pacific Fisheries Convention. BCF agents detected and documented that 33 other Japanese salmon vessels fished in violation of the same convention. The agents also detected South Koreans fishing salmon in the outer approaches to Bristol Bay. In addition, about 900 tons of yellowfin tuna were confiscated from five vessels for alleged violation of the U.S. regulations on yellowfin tuna, and two vessels were cited for apparent violation of fishing in a regulatory area.

Foreign fishing off United States shores continued in New England and the mid-Atlantic and increased off the Pacific Northwest coast and Alaska. The increased foreign fishing off Alaska included development of a Japanese fishery for herring in the northern Bering Sea, resumption of a U.S.S.R. trawl fishery for shrimp in the western Gulf of Alaska, increased trawling for groundfish in the eastern Bering Sea by South Korea, and the beginning of the South Korean fishery for salmon.

ACCOMPLISHMENTS AND OPERATIONS

Principal Accomplishments

BCF's more important accomplishments in 1969 are summarized according to geographic areas. These areas are North Pacific, California, Hawaii, South Central States, Gulf of Mexico, Atlantic, and Great Lakes. Activities that are general rather than regional are discussed under the heading "General."

North Pacific

Accomplishments in the North Pacific region were numerous: holding a workshop in Alaska to assist in developing domestic and foreign markets for products from latent Alaskan fisheries, progress in the Columbia River Fishery Development Program, control of oxidation in fishery products, work on design and inspection of

fish protective devices, progress in building a fish protein concentrate demonstration plant, studies of groundfish, studies of king crabs and tanner crabs, new technique for using refrigerated brine, new uses for selected fish species, activities on the Pribilof Islands, processing of shellfish waste into marketable products, studies of salmon, consideration of sausages as a possible new outlet for fish, progress in synthesis of alkyl isocyanates from fish oil, developments in water resources, and workshop conversion of shrimp separator trawls.

Alaska seafood marketing workshop.—In May 1969, BCF held a workshop in Anchorage, Alaska, to help develop domestic and foreign markets for latent Alaskan fishery resources. BCF, Alaska producers and processors, air freight carriers, container manufacturers, and retail and wholesale representatives discussed such topics as processing requirements, quality, air distribution, shipping containers, and merchandising. As a result of the workshop, communications were improved among processors, distributors, and retailers, and Alaska products were tested in several new markets.

Columbia River Fishery Development Program.—In 1969, the Columbia River Fishery Development Program continued to manage, preserve, and improve the anadromous salmon and steelhead trout resources of the Columbia River Basin. The Program funds the operation of 21 hatcheries, more than 700 screens, and 83 major fishways. Much of the work is carried out through contracts with the Bureau of Sport Fisheries and Wildlife and the conservation agencies of Idaho, Oregon, and Washington.

Columbia River salmon runs in 1969 were both discouraging and encouraging. Because the spring run of salmon arrived late, the fishery agencies assumed that the run was small and consequently they restricted the fishery. This assumption was erroneous —nearly 180,000 spring chinook salmon eventually passed Bonneville Dam, the largest count since 1938. These fish encountered great difficulties farther upriver, and many perished before reaching their spawning grounds. The principal causes for the deaths were poor passage conditions at John Day and Lower Monumental Dams and gas bubble disease caused by the water being supersaturated with nitrogen.

The summer runs of both salmon and steelhead trout in 1969 were smaller than in 1968, and only a limited fishery was allowed. Indian fishermen caught most of the fish above Bonneville Dam. The inundation of spawning grounds by upriver dams reduced the summer run of chinook salmon and steelhead trout.

In contrast, in the fall the run of chinook salmon was very good and the river fishery was better than usual. River fishermen caught 220,000 fish, which weighed 4½ million pounds. The river catch of coho salmon also was better than usual; it contributed a catch of 190,000 fish, which weighed 1,650,000 pounds. The hatcheries had excellent runs of fish and collected all the eggs they needed. Wild populations of coho salmon, however, decreased, possibly because of the very warm summer and low flows in tributary streams in 1967.

The problem of nitrogen supersaturation in Columbia River water appears to be quite serious. The water is supersaturated when most of the dams spill water. When the dissolved nitrogen reaches 130 percent saturation, which usually occurs during spring and early summer, fingerlings and adults often die. No immediate solution of this problem is evident. When storage dams in Canada are completed, however, and generating units are installed in all powerhouses, spills will be considerably smaller and infrequent. The nitrogen problem may then become less acute. Other problems concerning salmon and steelhead trout could develop, of course, with the advent of Canadian storage.

The newly constructed cul-de-sac fishery at Willamette Falls passed a considerable number of fish in 1969. The recently introduced run of fall chinook salmon broke all records with a tally of nearly 7,000 fish. The Willamette River run of coho salmon continued its upward trend, and nearly 17,000 fish passed the falls in 1969. Work on the other two phases of the Willamette Falls fishway is progressing rather slowly because the river has been high and has hampered construction. One fishway entrance is scheduled to be completed in the spring of 1970 and the project to be finished in 1971.

The hatchery evaluation work continues to confirm that hatcheries are supplying the backbone of the ocean and river fisheries for salmon associated with the Columbia River. For example, fishing for coho salmon in 1968 was relatively poor, but without the contribution of hatchery fish the entire season would have been a dismal failure. About one-fifth of the total catch of coho salmon was checked, and 20,000 marked fish were noted; therefore, the total catch had at least 100,000 hatchery-marked fish. Because only 10 percent of the fish released from the 18 Columbia River hatcheries involved in this study were marked, the contribution of hatcheries contributed well over one million coho salmon. This estimate is conservative, because unmarked fish survive better than marked fish.

The States of Oregon and Washington, using Federal funds, are performing research on hatchery-reared steelhead trout. Their studies show that survival is greatly improved if the fish are released between April 20 and May 10 when they weigh at least one-seventh of a pound.

A study of the cost of operating hatcheries and the value of the benefits is also under way. The purpose of the study is to determine whether better economic returns can be derived by rearing coho salmon or chinook salmon. Information is also being obtained on the optimum size for a hatchery. It now appears that the smaller stations are not good financial investments.

Control of oxidation in fishery products.—BCF's Food Science Pioneer Research Laboratory at Seattle, Wash., is studying oxidation in fishery products to determine how to control or minimize this reaction because uncontrolled oxidation causes fish to smell and taste rancid. The researchers are trying to obtain basic biochemical information on oxidative alterations in fish and fishery products and to develop means of altering or preventing these changes. They do not yet know how to stop fish from becoming rancid once the oxidation chain reactions have begun. They, however, are gaining information about the initial steps of oxidation. They are studying oxygen absorption in fish tissue, defining factors that offset the rate of absorption, and learning what happens to the oxygen during respiration of the tissue. They are also using model systems to study free radical formation and processing because they have shown that a free radical mechanism can start some oxidative reactions.

Design and inspection of fish protective devices.—In Portland, Oreg., BCF has a small staff of hydraulic engineers and fishery biologists who plan, design, and inspect barriers, fishways, locks, screens, spawning channels, and other devices needed in water development projects throughout the Nation including the Columbia River Basin. The advisory service performed by this staff continues to increase. During 1969, the staff assisted in development and review of plans and designs for fishways on the Connecticut River, at Conowingo Dam on the Susquehanna River, the Penobscot River in Maine, the Saugatucket River in Rhode Island, as well as for a number of smaller projects in California and Washington.

Major work within the Columbia River watershed included keeping a close check on construction of the now completed and highly successful portion of the new fishway at Willamette Falls. The staff also developed plans cooperatively with the U.S. Army

Corps of Engineers and the Fish Commission of Oregon for modifying the Fall Creek and Foster-Green Peter fish collection facilities.

The Snake River had two potential crises. One occurred while Lower Monumental Dam was filling, and the other at Little Goose Dam. BCF scientists successfully solved the problems, and fish passage facilities are now working well at both projects.

BCF and State fishery agencies reviewed operations of fish facilities on the main stem of the Columbia River and at Lower Snake River dams, particularly those operated by the U.S. Army Corps of Engineers. They found that the operating criteria for most of these projects need to be modified. The Corps is trying to correct faults in the pumping system at John Day, Lower Monumental, and Little Goose Projects on the Columbia River.

FPC (fish protein concentrate) demonstration plant.—In accord with Public Law 89–701, BCF awarded a contract in 1967 to design, construct, and operate an FPC plant in the Pacific Northwest to demonstrate the commercial feasibility of making FPC from hake. The contract covers design, construction, and 1 year of operation. The total cost is $2,446,921. Designed to process 50 tons of fish per day, the plant will cost about $900,000 a year to operate.

The plant will be located at Grays Harbor, Aberdeen, Wash. In 1969, the title was transferred from the Port of Grays Harbor to the Federal Government.

In 1969, the contractor moved the work through the design phase and into the construction phase. The plant is scheduled to begin shakedown operations in the fall of 1970 and be ready for continuous operating runs at the beginning of the hake season in 1971. Continuous operation is needed to obtain data on costs of processing and operating. Such data can be used by industry in establishing commercial production and providing a high-quality material for the development of food products by U.S. industry, universities, and the U.S. Agency for International Development.

Groundfish.—Scientists at BCF's Biological Laboratory at Seattle, Wash., have provided estimates of growth, mortality, and other population measures of stocks of hake and Pacific ocean perch. Preliminary estimates of the maximum sustainable yield served as the basis for the United States position in discussions with the U.S.S.R. to reduce its fishery on hake.

Considerable research was done on Pacific hake. The scientists found and used biochemical genetic systems to confirm the separation of Pacific Ocean and Puget Sound stocks of hake. Age studies

showed that the 1961 year-class for the past few years has dominated the portion of the population available to commercial harvest off Washington and Oregon. There is no indication of substantial recruitment of the 1962 year-class or the 1963 one. The research also showed that older and larger fish tend to be found in the northern part of the summer range.

King crabs and tanner crabs.—Research at the BCF Biological Laboratory at Auke Bay, Alaska, is providing U.S. negotiators and management agencies with the necessary background information for establishing quotas for the fishery for king crabs in the Bering Sea and Gulf of Alaska. Recent cruises by BCF vessels in the southeastern Bering Sea increased the knowledge of stock size, distribution, recruitment, and success of spawning. With this information, United States representatives obtained a 48-percent reduction in the king crab quotas of Japan and the U.S.S.R.

The laboratory found also that the stocks of king crabs are decreasing and those of tanner crabs are increasing. Catches of king crabs were 159.2 million pounds in 1966, 127.7 million in 1967, 85 million in 1968, and about 55.8 million in 1969. In contrast, catches of tanner crabs, which had previously averaged 7,000 to 14,000 pounds a year, were 118,000 in 1967, 3.2 million in 1968, and over 10 million in 1969.

The laboratory's studies indicate that tanner crabs are many times more abundant than king crabs. This great abundance is a basis for the growing interest shown by foreign and U.S. king crab fishermen, who contemplate shifting their efforts to tanner crabs.

New technique for using refrigerated brine.—Scientists at the BCF Technological Laboratory at Seattle, Wash., in 1969 continued tests begun in 1968 to modify a refrigerated-brine technique used for years by the tuna industry to freeze tuna aboard vessels. The successfully tested modification in 1968 involves refrigerating fish in a brine solution containing dissolved CO_2 (carbon dioxide).

In 1969, the scientists found the shelf life of halibut held in RSW (refrigerated sea water) and CO_2 was more than 1 week longer than that of halibut held in RSW without CO_2. Joint industry-laboratory experiments demonstrated the potential advantages for using the modified RSW system in holding tuna and salmon. In a BCF cruise to assess the saury resource and examine potential problems of preservation, the scientists investigated whether it was feasible to use the modified RSW. A comparison of saury held in ice and in the RSW+CO_2 indicated that saury held in the RSW[2] were of better quality. Unfortunately, the modification of

RSW+CO_2 has increased the corrosion in sea-water heat exchangers. The scientists are investigating practicable methods of overcoming this corrosion.

In 1969, as in 1968, the scientists found the new technique, when fully developed, will benefit industry. It will increase efficiency aboard vessels by eliminating the use of ice, improve the quality of the fish, reduce the costs of labor, and decrease physical damage to fish. Processing plants also will benefit from the technique, because it will enable them to increase the time the fish can be held without serious deterioration.

New uses for selected fish species.—In 1969, scientists at the BCF Technological Laboratory at Seattle, Wash., made further studies on using minced rockfish to prepare modified fish blocks. Using a flesh-separating machine, they obtained minced flesh that represented as much as 50 percent of the weight of whole rockfish. They mixed the minced flesh with various additives and made a modified fish block. The modified blocks containing antioxidants remained free of rancidity for at least 6 months at 0° F., whereas modified blocks with no antioxidants became rancid in less than 3 months. By controlling the blending time of the minced flesh with various additives, the scientists prepared a modified block with acceptable texture.

In other studies, the scientists are trying to develop a stabilized fish ration for marine mammals. They found that variation in the composition of herring can adversely affect the desired textural characteristics of an experimental food for porpoises. Herring caught in Puget Sound in October had too much fat to be acceptable. In comparison, they found that prespawning herring that were caught in February and frozen for 9 months made a porpoise food with an acceptable texture.

The scientists are also trying herring with DMS (dimethylsulfide) as bait for dungeness crab. They have found that the modified DMS product is equal to the standard bait, which is razor clams. This added application further increases the possibility of using this type of product in the domestic market, which, according to their previous estimates, needs 20 million pounds just for marine mammals in zoos and aquariums.

Pribilof Islands Aleut Community.—Activities in the Pribilof Islands in 1969 concerned the Aleut Community, management of the fur seal industry, and methods of harvesting fur seals.

An important feature of the Fur Seal Act of 1966 provides that the Aleut Community of St. Paul Island assume responsibility for self-government. During 1969, BCF and the Aleut Community

cooperatively developed a comprehensive community development plan. The goals of the plan are incorporation and eventual establishment of a self-governing community able to provide adequate municipal services and manage its own affairs. The Aleut Community of St. Paul has assumed increasingly greater responsibilities associated with self-government. These responsibilities include operation of a canteen, gas station, grocery store, and repair shop; regulation of alcoholic beverages; construction and rental of a postoffice; establishment of a voluntary fire department; participation in police protection; and appointment of a judiciary. During 1969, the community assumed additional responsibility for the operation of a company house (hotel and restaurant) and management and maintenance of the recreation hall.

Construction and assembly of eight new precut houses on St. Paul Island was begun in 1969 to relieve crowding and to provide housing for St. George Island residents who wished to move to St. Paul.

Sewage treatment systems designed to handle all sewage from the main part of the villages of St. Paul and St. George were completed and placed in operation during 1969.

Pribilof Islands fur seals.—Managing the fur seals was another important activity in 1969. A major goal is to determine how large a population of seals will produce the maximum sustained yield. An ideal population has been calculated to be one that will produce about 450,000 pups each year. Scientists estimate that the present population produces about 375,000 pups, thus it is somewhat below the optimum level. The present productive capacity of the Pribilof seals was tested by removing females and thus reducing the population somewhat and holding it stable. Beginning in 1969, females were not harvested and the population will be allowed to increase until it produces about 450,000 pups annually. Eventually, a somewhat larger harvest can be obtained.

The net commercial production of fur seals on the Pribilof Islands for 1969 was 38,805. St. Paul had a harvest of 32,789, and St. George 6,016.

Methods of harvesting fur seals received much attention in 1969. Since 1965 several animal protection societies have publicized the harvesting methods used for harp seals and hooded seals in the Gulf of St. Lawrence. News media have widely disseminated this publicity but have failed to distinguish between the kill of harp seals in eastern Canada and the kill of fur seals on the Pribilof Islands. The publicity caused considerable controversy in Canada and Europe and drew attention to the Pribilof Islands.

During 1968, a task force was formed to study other methods of killing and ways to improve the harvest. During 1969, the Virginia Mason Research Foundation, Seattle, Wash., in cooperation with BCF, the Humane Society of the United States, and the International Society for the Protection of Animals carried out a series of euthanasia experiments using hypoxic atmospheres. One of the conclusions reached was that the fur seal has no unusual oxygen stores with which to resist hypoxia. Additional experiments will be made in 1970. Considerable improvements were made to shorten the distance the seals have to be driven to reach the fields where they are killed.

Various cooperators analyzed tissues of California sea lions and northern fur seals for chlorinated hydrocarbons, studied the life cycle of fur seal lice, and assayed pineal glands for biochemicals that influence the glands' regulation of the reproductive cycle.

Processing of shellfish waste into marketable products.—Scientists of BCF's Technological Laboratory at Ketchikan, Alaska, are trying to find out if shellfish waste can be processed into marketable products. The scientists are studying the process developed by Food, Chemical and Research Laboratories, Inc., to convert shellfish waste into protein, chitin, and calcium chloride brine. They used shrimp-peeler waste and simulated a steady-state, four-stage, countercurrent extraction process. Although they used pilot plant equipment, the process was similar to that used in a commercial-scale plant. They used the data from this pilot plant work to prepare a proposal for the city of Kodiak to submit to Federal Water Pollution Control Administration for a Research-Demonstration Grant.

Salmon studies.—The principal research of the BCF Biological Laboratory at Auke Bay, Alaska, and the BCF Biological Laboratory at Seattle, Wash., relates to the international convention concerning salmon and other stocks harvested by the United States, Canadian, and Japanese fishermen. Research is also directed toward forecasting the size of anadromous fish runs returning to U.S. waters, principally Bristol Bay.

To test the hypothesis that various stages in the life history of salmon (particularly Bristol Bay sockeye salmon) are associated with certain oceanic features, experimental fishing for salmon on the high seas during summer, winter, and spring was accompanied by simultaneous oceanographic observations. The research team discovered that immature salmon were most abundant in the two

water areas nearest shore, Alaska Stream and Alaska Ridge, and least abundant offshore in western subarctic waters.

Scientists from the BCF Biological Laboratory in Seattle, Wash., perform research on Columbia River salmon. These studies primarily concern how water-use projects affect salmon and steelhead trout. The goal is to learn how to reduce losses and improve production of these fish. The research program is a multiagency effort. BCF research is closely coordinated with the programs and activities of the Bureau of Sport Fisheries and Wildlife, Federal Water Pollution Control Administration, U.S. Army Corps of Engineers, the fishery agencies of three States, private and public power companies, Battelle Northwest, and local universities. The fishery technicians and administrators of the Columbia Basin Fishery Technical Committee receive complete reviews of BCF progress.

Methods of bypassing juvenile fish around dams are being sought. BCF and the Corps of Engineers are cooperatively developing a system that uses a fish-guiding device and bypass. The bypass is rapidly being incorporated in seven dams operated by the Corps of Engineers.

Another means of protecting fish is to collect fingerlings at upriver dams and transport them by truck to a safer release point in the estuary. As a result of BCF studies, an estimated 70 percent loss of 5.5 million young salmon was averted during the 1969 fish run. Until the Canadian storage reservoirs are operating in 1973–75, flood waters will continue to flow over the spillways of Columbia River dams. These waters are supersaturated with nitrogen and kill some fish.

Still another method of protecting young fish is the use of the horizontal traveling screen developed by BCF. The Bureau of Reclamation is considering it for protecting valuable salmon and striped bass in the proposed peripheral canal of the Sacramento-San Joaquin Delta, where flows up to 30,000 cubic feet per second (13,500,000 gallons per minute) must be screened. The screen may cost one-third as much as conventional fish-guiding methods.

Other studies relate to the occurrence of increased temperatures and their tolerance by salmon and smelt. Model studies of the Columbia River, made by BCF in cooperation with the Federal Water Power Control Administration, indicated two possible happenings: First, heated water from a proposed thermal electric site near Kalama, Wash., would flow downstream to the site of another proposed thermal electric plant, and, second, potentially harmful heat pockets would develop in eddies adjacent to such plants.

In a different type of research, BCF forecast a run of 21 million sockeye salmon in 1969—a forecast that proved extremely accurate. Accurate forecasts are valuable to the fishing industry because they enable the industry to be ready to harvest and process the catch. A forecast that is only 70 percent accurate, for example, is valuable because it increases industry's return by $5 million.

Sausages—a possible new outlet for fish.—BCF is interested in recent amendments to U.S. Department of Agriculture regulations for ingredients and composition of frankfurters. The amendments reduce the maximum permissible fat content from 34 to 30 percent and permit replacement of as much as 15 percent mammalian meat with boneless chicken. These amendments suggested to BCF that fish flesh might be used by the sausage industry if BCF could establish that fish flesh has useful functional properties and does not adversely alter the appearance, odor, flavor, or keeping quality of existing products.

To determine the feasibility of this usage, a commercial sausage processing facility modified one of the standard frankfurter formulas by replacing 15 percent of the meat with the same amount of ground flesh of lingcod. This flesh was mixed with the appropriate amount of salt and other flavorings before being incorporated into the meat "emulsion." As expected, adding salt to the lingcod flesh produced a firm, elastic gel. The plant management was greatly interested because this property plus that of emulsification is particularly desirable in any flesh that it uses. About 200 pounds of franks and bologna were prepared without altering the cooking or smoking procedure. Scientists at BCF's Technological Laboratory at Seattle, Wash., are holding some of the product under refrigeration and plan to carry out acceptability tests and studies on its refrigerated storage life. Pleased with the product, the management wishes to test other species of fish.

Synthesis of alkyl isocyanates from fish oil.—In 1969, scientists of BCF's Food Science Pioneer Research Laboratory at Seattle, Wash., made good progress in their experiments with fish oils. They developed and verified a synthetic route for producing alkyl isocyanates. These alkyl isocyanates can be used industrially in plastics. During the investigation the scientists also evolved an excellent method for synthesis of intermediate compounds—the unsaturated alkyl nitriles. Although alkyl nitriles have long been an important industrial chemical, they have been limited to saturates. The potential availability of the unsaturated compounds may interest the industrial chemical market.

Water resource developments.—BCF through its Regional

Water Resource Coordinators and its river basin staff in Alaska and in the Columbia River Basin works closely with the Bureau of Sport Fisheries and Wildlife and State conservation agencies to review all plans for proposed water development projects to assess their potential effects on fishery resources. Unless properly planned and executed, many such projects can modify or destroy the aquatic environment and thus harm valuable fishery resources. BCF determines what is necessary to maintain or increase fishery resources in face of such proposed developments and makes specific recommendations to modify project plans to accomplish this purpose.

Water resource investigations by BCF personnel include almost every type of project that would in any way modify or destroy the aquatic environment. Studies are made on the following:

- Dams and reservoirs for irrigation, flood control, navigation, and hydroelectric power.
- Diversion of fresh water destined for estuaries.
- Channel dredging, spoiling, and bulkheading.
- Marsh drainage, diking, and levelling.
- Oil and gas exploration, sealing, and production, and mining.
- Review of water quality standards.

The water resources staff of the BCF Portland Program Office has evaluated the effect on fishery resources of 41 major water development projects during 1969. In addition, 461 public notices issued by the U.S. Army Corps of Engineers were reviewed; of these, 51 required separate action. The water resources staff also participated in four major comprehensive studies: the Willamette Basin Comprehensive Review, which was completed; the Puget Sound and Adjacent Waters Study, which was completed and is being reviewed; the Columbia North Pacific Study, for which the fishery portion is being reviewed; and the California Comprehensive Study, which is scheduled for completion in late 1970.

BCF participation in a study of the Gate Creek Project, Oreg., has led to a unique project that involves raising salmon in a reservoir.

The Fish and Wildlife Enhancement Report of the Columbia Basin Project was completed in 1969 and is being reviewed before release. Over $1 million of fish and wildlife benefits annually may result from this project.

The rapid growth of the petroleum industry in Alaska has required considerable effort by BCF's River Basin Studies staff. The petroleum industry is making extensive oil and gas explorations in the Gulf of Alaska, Lower Cook Inlet, and along the entire coast-

line from Bristol Bay north to and including Beaufort Sea. Many oilmen consider the recent oil discovery on the North Slope to be one of the largest oil deposits on the North American Continent. Detailed studies by the petroleum industry are under way to develop final plans for installing an 800-mile-long 48-inch pipeline extending from Prudhoe Bay area on the North Slope to Valdez in Prince William Sound.

How the oil exploration and development, construction, and operation of the pipeline and related facilities will affect fish and wildlife resources is largely unknown. BCF, however, in cooperation with the Bureau of Sport Fisheries and Wildlife made preliminary investigations of the fish and wildlife at the proposed pipeline and terminal sites in the summer of 1969. In addition, the BCF River Basin Studies staff helped the Bureau of Land Management in its work on the stipulations to be included in the Department of the Interior's permit for the pipeline project.

Workshop conversion of shrimp separator trawls.—In cooperation with the Oregon State University Extension Service, personnel of BCF's Exploratory Fishing and Gear Research Base at Seattle, Wash., held workshops at Newport, Brookings, and Astoria, Oreg., to show fishermen how to convert standard shrimp trawls to separator trawls. At the workshops, standard nets were converted to shrimp separator trawls while all the fishermen took part in some of the actual work. This experience prepared them to make their own conversions later. The fishermen enthusiastically received these efforts, and it appears that most of the Oregon shrimp fleet will be using separator trawls when the shrimp season opens in spring 1970.

California

In California, the chief accomplishments in 1969 include fish-school mapping service, discovery of fur seals, study of San Pedro wetfish fishery, and vocational education.

Fish-school mapping service.—The BCF Fishery-Oceanography Center at La Jolla, Calif., is developing a towed sonar. It is intended to count fish schools, measure their cross-sectional area, and estimate size of the school. On a recent cruise scientists aboard the *David Starr Jordan* mapped fish schools over a 200,000-square-mile area. Areal estimates indicate that 1 million fish schools (probably anchovy) are present along the coasts of California and Mexico.

Fur seal discovery.—On August 24, 1968, two employees of the University of California and one employee of the Smithsonian

Institution discovered 86 female northern fur seals on San Miguel Island, one of the channel islands off southern California. On August 23, 1969, they found 175 females on the island. BCF and the University of California are cooperating in a behavior study of these seals. This discovery is the first confirmed record of northern fur seals breeding on any island in the eastern Pacific other than the Pribilofs.

San Pedro wetfish.—BCF's Fishery-Oceanography Center at La Jolla, Calif., has been making a cost-earnings study of the San Pedro wetfish fleet. In collaboration with BCF economists, the center staff have made a costs and earnings model of the multispecies wetfish industry. This model uses information on behavior and distribution of the fish, fishing success of the purse seine, dockside value of total catch, and total expense of the boat owner.

A study of the model indicates that new vessels cannot profitably enter the wetfish fleet unless changes are made in crew size, catch rate, and lay shares.

Vocational education.—A regular part of BCF's Marketing Program in California is vocational education. In cooperation with State universities, trade schools, high schools, Job Corps Training Centers, the Food Education and Service Technology (FEAST) program, and others, the BCF staff works with students who are preparing for employment in the food service field. To create and develop interest in fishery products, BCF uses slide presentations, films, lectures, and cookery demonstrations.

Another aspect of this work involves a training program for apprentice meat cutters in cooperation with the State of California and a training program for employees in military commissaries. Through these programs, apprentice meat cutters become better prepared to handle, identify, and sell retail fishery products, and commissarymen are given an opportunity to promote the use of fish and shellfish in the military.

Hawaii

In the Hawaii area, the chief accomplishments in 1969 were the discovery of a better baitfish for tuna and potential development of a tuna night fishery.

Tuna baitfish.—The tuna fishery of the Central Pacific now has a better baitfish to use in its pole-and-line method of fishing. The BCF Biological Laboratory at Honolulu has tested another baitfish, the fresh-water threadfin shad, to replace the native nehu. Readily adaptable to salt water, this shad has proved as effective a

bait as nehu in the skipjack fishery and survives better in baitwells.

Tuna-tagging studies.—Tagging has shown that a night fishery for tuna may be forthcoming. Scientists at the BCF Biological Laboratory at Honolulu studied the travels of a small tuna that had been fed an ultrasonic transmitter. They found that the tuna traveled farther at night than in daylight and was always at the surface at night. If the tuna habitually swim at the surface at night, the scientists think that it might be possible to develop a night fishery. Fishermen would have to locate the schools at night, but could do so by observations of luminescence in the water, sonar, or perhaps a sonic-tagged tuna.

South Central States

The chief accomplishments in 1969 in the South Central States concerned catfish. BCF coordinates its activities with those of other Federal and State agencies and the Catfish Farmers of America Association to help develop improved production, marketing efficiency, and increased consumption of farm-raised catfish. Of special interest are the efforts to improve marketing operations and increase consumption of catfish.

Improving efficiency of marketing catfish.—Through its Marketing office in Little Rock, Ark., BCF has continuous liaison with the catfish farming industry. This work involves assistance in improving the efficiency of marketing operations by providing information to industry on market potential, distribution, quality control, cost reduction, and merchandising.

Increasing consumption of catfish.—BCF's work also includes efforts to encourage consumption of catfish through Government publications, media publicity in newspapers, television, and radio; and through contacts with potential markets.

Gulf of Mexico

In the Gulf of Mexico the chief accomplishments in 1969 were home economics training, red snapper storage life extension, shrimp studies, and water resource developments.

Home economics training.—At its Pascagoula, Miss., test-kitchen station, BCF's Division of Marketing has training facilities for home economists who have an interest in a career in fisheries education. In 1969, four home economists participated in a 6-week training course at Pascagoula. Participants are trained in preparation of recipes for consumers, identification of commer-

cial species of fish and shellfish, cookery demonstration techniques, and handling and dressing fish and provided facts about the fishing industry. Plant tours are arranged to familiarize the participants with the industry. At the end of the course, each home economist gives one demonstration for the extension service and one for television.

Red snapper storage life extension.—Scientists of the BCF Technological Laboratory at Pascagoula, Miss., have successfully extended the storage life of the red snapper for a year. Market development of large unutilized stocks of snapper in the Caribbean has been limited because of rapid browning of the fillet, discoloration of the red skin pigment, and curling of the skin when cooked. The scientists solved these problems by treating the fillets with a special chemical TDP (3,3[1]-thiodipropionic acid) and packaging them in cryovac bags.

Shrimp studies.—The BCF Biological Laboratory at Galveston, Tex., in 1969 continued its biological studies of shrimp and its methods of forecasting the abundance of shrimp. To extend prediction lead time, the scientists are examining oceanic conditions that influence reproduction and survival of young shrimp. They found that persistent seaward winds may prevent shrimp larvae from entering estuaries. The result is greater larval mortality and less growth among the survivors. These studies benefit the State agencies responsible for regulating the industry and the fishing industry.

Water resource developments.—Studies for the Gulf of Mexico estuarine environment were completed, and atlases are being prepared. These closely coordinated comprehensive studies begun in 1966 were carried on jointly by scientists of the Marine Fisheries Departments of Alabama, Louisiana, and Mississippi and from BCF's St. Petersburg Beach, Fla., and Galveston, Tex., laboratories. The data from these studies will be extremely valuable to groups concerned with preventing further unwise exploitation of irreplaceable resources.

Scientists from BCF's Tropical Atlantic Biological Laboratory at St. Petersburg Beach, Fla., and the regional Office of Water Resources Studies participated in interagency studies and related activities that helped bring about a high-level Governmental decision to relocate the Miami Super Jetport. This huge project, already under construction, encompassed about 39 square miles of the Everglades just north of the Tamiami Trail. Results of the study showed that the project, if completed, together with expected future development around it, would have endangered the

Everglades National Park. Of special interest is the park's almost pristine estuarine zone, which is the nursery for the pink shrimp that support the multimillion dollar Tortugas fishery.

In 1969, the Florida Cabinet gave final approval to establishing 25 aquatic preserves throughout Florida. BCF scientists provided appropriate data and counsel and thus helped the Florida legislature take this much-needed action to prevent the exploitation of the State-owned submerged land.

The Offices of the Water Resources Coordinator also is responsible for coordinating BCF activities in the multiple agencies' study of Louisiana estuaries. The purpose of the study is to determine how the estuaries and coastal marshes of the Mississippi Delta can be protected from further destruction. Determination of how much fresh water is needed to maintain this environment is a major part of the study.

Atlantic

The chief accomplishments of the Atlantic coast in 1969 concerned containers for shipping fish, artificial structures to attract fish, groundfish fisheries, herring studies, lobster-tagging program, menhaden research, microwave energy for opening oysters, midwater trawl gear trials, new system for surveying calico scallop beds, oyster culture, pollock as an alternate fishery to haddock, shipboard fish-processing system, tuna larvae culture, and water resource developments.

Containers for shipping fish.—The BCF Technological Laboratory at Gloucester, Mass., has completed work on developing an insulated box that can be used to ship fresh fishery products long distances. Tests have determined how various transporting facilities (aircraft, trains, and trucks) affect the efficiency of shipment and quality of product at the point of delivery. Efficient commercial-type containers have been built and are being tested in cooperation with industry to determine their effectiveness in shipping frozen fishery products to the tropics.

Fish attraction with artificial structures.—Artificial structures positioned off Panama City, Fla., during July 1969 attracted commercial quantities of round scad, scaled sardines, and Spanish sardines. The position of the structures in the water column and their design were important factors in attracting fish. Midwater structures that resembled small pup tents attracted as much as 25 tons of fish and consistently attracted 0.5 to 5 tons daily. SCUBA divers estimated the numbers of species present at the structures.

Groundfish fisheries.—Data of the BCF Biological Laboratory at

Woods Hole, Mass., aided the United States in international negotiations with U.S.S.R., Poland, and other foreign nations fishing outside the 12-mile limit off the Atlantic coast. Scientists of the laboratory contributed significant data on the status of the stocks of flounder, haddock, hake, and scup.

New regulations for haddock on Browns Bank and Georges Bank agreed to by the International Commission for the Northwest Atlantic Fisheries include closed areas during the spawning season and annual quotas by nation. The haddock has declined since 1966, partly because of heavy U.S.S.R. fishing in 1965–66. BCF scientists who have studied this fishery since 1931 accurately predicted this decline.

Herring studies.—Large fluctuations in abundance or availability of immature stocks of herring are a recurring problem for the Maine sardine industry. Scientists of the BCF Biological Laboratory at Boothbay Harbor, Maine, believe that recently measured variations in mortality during the first winter of life are one cause of these fluctuations.

Lobster-tagging program.—Since 1966 scientists of the BCF Biological Laboratory at Boothbay Harbor, Maine, have tagged 7,700 lobsters to determine, among other things, if inshore stocks are separate from offshore stocks. The information will be used to help manage the fisheries now harvesting lobsters from both areas.

Present evidence suggests the fishery operates on two separate stocks. Although the faster growing offshore lobsters migrate considerable distances, moving to shallower zones in spring and summer and to deeper areas in fall and winter, no migration from offshore grounds into the Gulf of Maine has yet been discovered, and tagged inshore lobsters apparently move little.

Menhaden research.—Scientists of the BCF Biological Laboratory at Beaufort, N.C., finished menhaden tagging studies designed to map more precisely the paths of migration of this valuable resource. Since 1966 they have tagged over 1.2 million menhaden. Research has shown the scientists that Atlantic menhaden spawn principally off the Middle Atlantic States where current patterns affect survival and the movement of young menhaden into estuaries. Gulf menhaden spawn off the Mississippi Delta. Tag returns suggest the Atlantic stock is being overfished.

Microwave energy for opening oysters.—Scientists of the BCF Technological Laboratory at Gloucester, Mass., completed a study in 1969 to determine how microwave treatment affects the processing and storage characteristics of raw oysters. The microwaves

are used to open the oyster shells. The microwave treatment resulted in a 50-percent increase in shucking productivity without reducing the total yield of meats. Twenty-one bushels of whole oysters yielded 19 gallons of oyster meats.

Midwater trawl gear trials.—Using the West German Herman Engle midwater trawl, the *Delaware II, BCF's* newest exploratory fishing research vessel, trawled for herring off New England. During these tests, the vessel made 59 midwater trawl tows in the western Gulf of Maine. As much as 60,000 pounds of herring per tow were caught. The two largest catches (60,000 and 55,000 pounds) were taken on 40-minute sets made in an area where the echo sounder showed concentrations of fish. The cruise demonstrated that midwater trawl fishing is effective when schools of herring are abundant and concentrated in a relatively small geographic area.

New system for surveying calico scallop beds.—The staff of the BCF Exploratory Fishing and Gear Research Base at Pascagoula, Miss., developed RUFAS (Remote Underwater Fisheries Assessment System) to aid in fishery research. RUFAS is a towed, remotely controlled underwater sled equipped with television and motion picture cameras. It can be towed at any desired depth between the surface and the bottom of the ocean. The first assignment for RUFAS was to explore the calico scallop beds off the east coast of Florida. RUFAS detected concentrations of scallops and provided visual information on the abundance of the scallops. This system seems to be a valuable tool for finding areas where the scallops are in commercial abundance.

Oyster culture.—The BCF Biological Laboratory at Milford, Conn., performs BCF's principal research on oyster genetics and selective breeding. Preliminary tests on American oyster larvae indicate that one cause of the size variation in oysters is attributable to genetic variation, which can be influenced by selective breeding. The scientists suggest that the fastest growing larvae from several genetic lines be selected and then hybridized for maximum growth.

Other studies indicate that local oysters carry deleterious genes that reduce the proportion of viable larvae when the oysters inbreed. Good management then requires several lines of oysters on a bed or on adjacent beds to permit crossbreeding.

Pollock as an alternate fishery to haddock.—In May 1969, BCF's Division of Marketing began a concentrated effort to help industry establish a pollock fishery to offset the declining haddock fishery. Over 4,000 retail chain stores and 5,000 volume-feeding

outlets in the eastern United States were encouraged to use pollock. A large amount of publicity was obtained through press and broadcast media. BCF efforts were alined with related efforts of the State of Massachusetts and industry organizations. Pollock landings of 7.1 million pounds in 1969 were 32 percent higher than in 1968. Sales of fresh pollock fillets of high quality have increased in such outlets as retail chain stores.

Shipboard fish-processing system.—Personnel of BCF's Technological Laboratory at Gloucester, Mass., made good progress in 1969 in the shipboard fish-processing system. Their preliminary studies on use of vacuum and steam to pasteurize the surface of fish resulted in a remarkable reduction in bacteria. Taste test scores showed the control sample was rejected on the 12th day of iced storage; the pasteurized samples were not rejected until the 16th day.

The personnel also constructed a small retort capable of holding only one fish to test the feasibility of a carrousel-type apparatus in which the fish would be alternately subjected to vacuum-steam-vacuum. On discharge from the carrousel, the fish will enter the conveying system.

In addition, the personnel used a vessel hold mock-up in which to set up a positive displacement blower unit and plastic tubing for pneumatically conveying fish from the vessel's deck to storage pens. The tests showed the concept to be sound.

Tuna larvae culture.—For the first time in history, tuna eggs, collected at sea, were hatched in a laboratory and the young kept alive about 3 weeks. The research staff of the BCF Biological Laboratory at Miami, Fla., obtained the eggs from a sample of mixed plankton collected off Miami. Such studies will allow determination of the physiological requirements and limitations of various tuna species. This information is essential for interpreting causes of annual differences in survival and in year-class strength and for learning if tunas can be reared commercially.

Water resource developments.—The North Atlantic Region during 1969 reviewed and reported on 200 separate water resource development projects. Most of these projects would alter estuaries and coastal environment by navigation improvement, beach erosion control, and hurricane protection. The Office of the Water Resources Coordinator represented BCF on nine technical and policy committees relating to fishery studies throughout the Northeast. Most of the committee activity concerned conservation and development of commercial fishery resources associated with construction of conventional, nuclear, and pumped storage power projects.

Great Lakes

The chief accomplishments in the Great Lakes region in 1969 were catfish research, fish-environment relations, fish stocks in Lake Erie, insecticides in fish from Great Lakes, preservation of fish by controlled atmospheres, sea lamprey control, and water resource developments.

Catfish research.—The BCF Technological Laboratory at Ann Arbor, Mich., continues to work with industry to develop new processing equipment for sorting, gutting, heading, and skinning catfish. The laboratory also carried out research on developing new catfish products with wide consumer appeal that can be successfully distributed into new markets. In addition, the laboratory provided information on layouts for a processing plant and recommendations for process flow as well as engineering specifications on refrigeration requirements for freezing and storing catfish products.

Fish-environment relations.—Scientists of the BCF Biological Laboratory at Ann Arbor, Mich., completed studies on temperature requirements for successful incubation of lake herring eggs and on temperature tolerance of young lake herring. The laboratory makes this information available for use in establishing water quality criteria. The information should prove valuable in evaluating possible effects of a number of nuclear power plants planned for installation on the Great Lakes. Another study revealed that sudden water temperature changes may be the major cause of alewife die-offs.

Fish stocks in Lake Erie.—BCF's Biological Laboratory at Ann Arbor, Mich., continued the seasonal assessment of the relative success of the hatching of important fishes in Lake Erie to provide the basis for predicting their abundance in coming years. Recently completed studies of walleye provided information on the reproductive potential and discreteness of eastern and western Lake Erie populations.

Insecticides in fish from Great Lakes.—Scientists of the BCF Biological Laboratory at Ann Arbor, Mich., provided data that led to banning or reduction in use of DDT in some States adjacent to the Great Lakes. These studies also showed that pesticide residues concentrate disproportionately in various parts of the body of a fish. Consequently, the ordinary preparation of fillets of fish such as perch produces an edible product well within safe tolerance limits.

Preservation of fish by controlled atmospheres.—Scientists of BCF's Technological Laboratory at Ann Arbor, Mich., continually

seek new and better ways to store and increase the shelf life of fish and fishery products. They have demonstrated that the shelf life of perishable foodstuffs can be increased if they are placed in gaseous environments that inhibit growth of spoilage organisms. In their experiments they have used gaseous environments with various ratios of carbon dioxide, oxygen, and nitrogen. They have also tested a combination of irradiation and controlled atmospheres.

Recent research has led to demonstrations showing that the shelf life of fresh fishery products can be extended up to 1.5 times over normal conditions when controlled atmospheres are used in vessel holds, shipping boxes, or retail packages. Controlled atmospheres consist of specific ratios of carbon dioxide, oxygen, and nitrogen. Studies continue on how various controlled atmospheres affect microflora.

Sea lamprey control.—Scientists of the BCF Biological Laboratory at Ann Arbor, Mich., and the Department of Fisheries of Canada, under the direction of the Great Lakes Fishery Commission, continued lamprey control operations in Lakes Superior, Michigan, and Huron. Lampricide, a chemical lethal to lamprey larvae but harmless to game fish, was applied to those lamprey-infested streams requiring treatment. In Lake Superior, an assessment of the lamprey spawning population showed some increase over that of 1968, but the present population represents an 82-percent reduction of the precontrol level.

Catch curves of the relative abundance of lake trout planted in 1955 and 1958–63 at various locations in Lake Superior show total mortality rates are closely correlated with incidence of sea lamprey wounds on trout. In recent years the mortality rates of lake trout show a downward trend in all areas.

Water resource developments.—In the Inland Region, BCF in 1969 placed increased emphasis on project-related problems involving water quality, particularly thermal effluent from nuclear power plants and channelization, dredging, and manipulation of water levels in the Great Lakes. During 1969, the Water Resources Coordinator participated in seven Comprehensive Basin Studies; three of these are almost finished. With completion of the Lake Superior report for the Great Lakes-Illinois River Basin Project Study, a five-volume series covering the entire Great Lakes system will be available. While BCF reports emphasize water quality aspects, they provide the most complete lake-by-lake compilation to date of the total fishery resource and its environment. Results, conclusions, and recommendations in these reports have had a

major impact in shaping the position of Federal and State agencies on fishery aspects of Great Lakes water quality problems.

The final commercial fishery report was completed for the Upper Mississippi Basin Framework Study. A major report recommendation that commercial fishermen should organize themselves for their own benefit and benefit of the resource became an actuality when the Upper Mississippi Valley Fisheries Council was formed.

General

Many BCF activities in 1969 were general rather than regional. These activities concerned BCF use of Navy data, cooperatives, economic research and management, Federal Aid Program, FPC (fish protein concentrate) commercial production, FPC in foods, FPC research, fishery product publicity, fishery statistics, inspection and certification program, Market News Service reporting, standards and specifications, transportation, and water resource developments.

BCF use of Navy data.—BCF established a small environmental forecasting unit at the U.S. Navy Fleet Numerical Weather Center at Monterey, Calif. This center receives and analyzes a vast amount of oceanographic and meteorological data from all over the world. BCF's goal is to identify that portion of the Navy's data that can be used by fisheries in oceanographic forecasting and thus add to similar information already available.

Cooperatives.—BCF economists continued to administer, in behalf of the Secretary of the Interior, the provisions of the Fishery Cooperative Marketing Act of 1934. Technical information was given to several fishery cooperatives throughout the United States, and technical information and advice were given to groups that were considering the formation of fishery cooperatives.

Economic research and management.—The major goal of BCF economic research is to develop information that BCF can use to make decisions on programs and policies that the U.S. fishing industry can use to improve business management decisions. Research activities during 1969 can be classified into (1) development of methodology (basic research), (2) applied research for general use, and (3) applied research for development of policy.

Because economic theory and research methodology as they relate to fishery problems are often inadequate, some time was devoted to these areas of research. One project along these lines was the development of a bioeconomic model of fisheries that proved more usable in applied research than previously available models.

A second project in research methodology was to develop benefit/cost calculation procedures for evaluation of BCF programs. BCF's Division of Economic Research developed computer programs to calculate benefit/cost ratios and return on investment in a fishery.

Applied research for general use was conducted in a number of areas. The Division of Economic Research completed cost and earnings analyses for the mackerel fleet of southern California, pond-reared catfish, and Polish large trawlers. In addition, a computerized vessel design study was completed for the New England groundfish industry.

Also in the area of applied research for general use, the Division of Economic Research, in conjunction with the Division of Current Economic Analysis and universities, studied the demand for major fish species consumed in the United States. The market potential for these species can be evaluated on the basis of information in the studies.

Analyses leading to the quarterly projections of supply, consumption, and prices of fishery products were made by the Division of Current Economic Analysis. These projections formed the basis for the outlook portion of quarterly situation and outlook reports, which were distributed to industry and government agencies throughout the world. This economic information is provided to facilitate rational decisions on production, distribution, inventories, and pricing of fishery products.

Economic research in foreign trade problems included an analysis of the effects of groundfish imports on the U.S. groundfish industry.

Market studies, together with harvesting cost relationships and bioeconomic models, were used in a project by the Division of Economic Research to estimate the future consumption and price of tuna. The findings of this study were used to make recommendations on the BCF's program of tuna research.

An analysis of shrimp consumption and prices is nearing completion and will also be used as a basis for program planning.

A number of additional studies were completed for use in policy formulation. An incentive management plan was developed as a tool in accelerating the development of latent resources. A study of how mandatory inspection would affect shrimp processors was completed in order to determine the adjustments that processors would have to make and their need for financial assistance during an interim period. The economic feasibility of radiation-processing

was found for a number of fishery products so that future program decisions can be made in this development area.

Assistance to State and local agencies was given in the form of (1) evaluation of proposed guidelines for certain fishing restrictions on the Great Lakes, (2) evaluation of the potential for fish processing in an inner city, and (3) preparation of a report on the many aspects of supply, demand, and international trade of fishery products in the waters of the State of Alaska.

In 1969, the Division of Economic Research began collecting cost and earnings data on fishing operations. Included was a coordinated effort with other BCF units and with State and local agencies, individual fishermen, and accountants. As a result of these first efforts, information is now available on about 6,000 vessel-years of operation. Another important survey, which was done through contract, provided information on annual purchases by households of fish products by species, product form, and method of preservation. The survey covered 1,500 households representing various socioeconomic characteristics. Finally, institutional buyers, fish processors and wholesalers, and retail food stores were surveyed to determine the flow of fishery products through market channels and to determine what kinds of products are purchased by institutional and retail food buyers.

Federal Aid Program.—Three acts authorize the BCF Federal Aid Program. These acts are the Commercial Fisheries Research and Development Act of 1964 (Public Law 88–309), as amended, the Anadromous Fish Act of 1965 (Public Law 89–304), and the Jellyfish Act of 1966 (Public Law 89–720). At the end of calendar year 1969, under these authorizations, the grant-in-aid program has amounted to $42 million, of which 67 percent or $28 million was Federal moneys. Appropriation under these acts is about $6 million.

The Commercial Fisheries Research and Development Act of 1964 was amended in 1968 for 4 years ending June 30, 1972. All 50 States, the Commonwealth of Puerto Rico, and the governments of the Virgin Islands, Guam, and American Samoa are participating in the program and carrying out cost-sharing projects concerned with research, development, conservation, and management of the Nation's commercial fishery resources. Cost-sharing projects are funded at either a 50- or a 75-percent level of Federal participation, whereas projects to alleviate resource disasters and to establish new commercial fisheries may be financed with 100 percent Federal funds.

As of December 30, 1969, the obligations were $24 million, which include about $17 million Federal funds and $7 million State funds. At the end of calendar year 1969, 342 projects had been approved; 149 of these have been completed.

Of the 342 projects approved to date, 214 are directed toward research on marine and fresh-water resources; 77 for development that includes technology, exploratory fishing and gear development, statistics, economics, and other related activities; 32 for construction of laboratories, vessels, ponds, and related facilities; and 19 for planning and coordination.

The largest effort of this program is directed toward research on our Nation's valuable resources. Scientific information is being obtained on the variety of shellfish species such as shrimp, oysters, clams, lobsters, and crabs. Studies are under way on marine and fresh-water finfish species that include salmon, catfish, lake trout, baitfish, and the variety of species that inhabit our lakes and reservoirs. The estuarine, fresh-water, and marine environments are also being investigated. There is a continuing need for information of this type to improve and to maintain current understanding of these resources. These resources, in turn, provide a sound scientific basis for management.

The second largest effort in this program has been to make studies that, in most cases, directly benefit industry. Economic studies have evaluated valuable State resources from the catch to the consumer and have pointed out apparent needs that would improve the industry. Such studies have been made in Georgia, Maryland, and Montana. Technological studies have been under way to develop methods to improve quality of seafood products during harvesting and processing in Maryland, Massachusetts, Mississippi, and North Carolina, and the utilization and development of new products in Oregon and Washington. The collection of statistics in Alaska, Arkansas, California, Massachusetts, Puerto Rico, and Texas has provided the basic information that State agencies need to evaluate their natural resources. This type of work will continue because much remains to be done.

The third largest effort of this program has been to provide necessary facilities for the research and development projects of the States. Laboratories, research vessels, and ponds have been or are being constructed in many States. These facilities enable State biologists to carry out scientific experiments and tests under controlled conditions, thereby gaining information that would otherwise not be possible to obtain.

The second act, the Anadromous Fish Act of 1965, authorizes

the Secretary of the Interior to enter into cooperative agreements with States and other non-Federal interests for conservation, development, and enhancement of anadromous fishery resources of the Nation and fish in the Great Lakes that ascend streams to spawn. BCF and the Bureau of Sport Fisheries and Wildlife administer this program jointly at the Federal level. Federal funds up to 50 percent may be used to finance project costs. State fishery agencies, colleges, universities, private companies, and other non-Federal interests in the 31 States bordering the oceans and the Great Lakes may participate.

The Anadromous Fish program was begun in October 1967. At the end of calendar year 1969, more than $15 million had been invested to help finance more than 200 projects. The States and non-Federal interests have matched the Federal dollars for project work; the total investment, therefore, is more than $30 million.

Accomplishments under this program in 1969 were many. Inventories of the anadromous fishery resources of Maine and the Great Lakes were completed for use in developing management plans. Coastal streams in Washington and Oregon were surveyed, and priority for improvement assigned on needs and a cost-benefit analysis. Techniques for short-term forecast of timing and size of salmon runs as they near inshore fisheries were improved. Striped bass work among the South Atlantic Gulf States resulted in significant findings on the factors that limit survival of hatchery-produced fish. Information was obtained on how the behavior of shad is affected by changes in the temperature of the Connecticut River after installation of a nuclear power plant. Annual benefits from a fish screen installed at Scott Valley irrigation diversion from Scott River, Siskiyou County, Calif., are 14,200 pounds of commercially caught silver and king salmon. In addition, screening is under way for the Glenn-Colusa irrigation diversion from Sacramento River, Glenn County, Calif. Fish passage facilities are being constructed at barriers in coastal streams of Maine, Massachusetts, New Hampshire, and Rhode Island for improving the alewife fisheries, in tributaries of Delaware River for rehabilitating shad runs, and in tributaries to Bogachiel River, Wash., for opening up salmon spawning and nursery areas. One newly constructed salmon hatchery and two major hatcheries now being built will contribute significant numbers of young salmon to coastal streams.

The Jellyfish Act of 1966, the third act, authorizes an appropriation of funds to be used by the States and other non-Federal interests on a cost-sharing basis to control and eliminate jellyfish and other such pests and to study ways of controlling floating

seaweed. The 22 coastal States and the Commonwealth of Puerto Rico are eligible for assistance. At the end of calendar year 1969, seven projects at a total cost of $268,714 had been funded in Maryland, Mississippi, New York, and Virginia. Project activities are concerned primarily with biology and control of jellyfish.

In Chesapeake Bay, scientists in Maryland and Virginia have obtained basic data on the various life stages, growth, reproduction, and feeding habits of the stinging jellyfish known as the sea nettle. Present studies have obtained information on the seasonal occurrence and distribution of sea nettles in the bay and in various major rivers that lead into the bay. Work is just beginning on physical barriers that will protect swimmers on the beaches. A combination of netting and water jets has been tested in the laboratory and will be tried under field conditions.

Florida, Mississippi, and Puerto Rico are examining the occurrence, distribution, and abundance of the Portuguese Man-of-War in their coastal waters. Work is also under way to determine growth, reproduction, and food habits of the Portuguese Man-of-War. During survey activities in Puerto Rico, a particularly dangerous species of jellyfish not previously reported from the area was collected and identified as *Chiropsalmus quadrumanus*. Other jellyfish are being collected and identified to determine what species are or might be harmful.

A marine alga that covers productive oyster-producing bottom is being investigated in Long Island Sound. Overwintering stages of the alga have been collected and cultured under laboratory conditions. Work is under way to determine factors that influence growth and reproduction to try to determine a time in the life cycle when the alga could be controlled.

FPC (fish protein concentrate) commercial production.—Industry interest in the commercial production of FPC increased in 1969. A number of companies announced plans to design and construct plants that will use a number of processes and process variations. The company under contract to AID (Agency for International Development) to provide FPC for AID programs delivered 62 tons of acceptable product in 1969.

FPC in foods.—BCF's National Home Economics Research Center Program, Washington, D.C., developed 24 recipes that use FPC. Half of the recipes were developed for the consumer level and the other half for institutional use. The recipes are for soups, quick bread entrees, and desserts.

FPC research.—In 1969, BCF began investigating the adapta-

tions of solvent extraction techniques to new solvent and solvent mixtures. The type of solvent used has a marked effect on both the cost of the process and the functional properties of the FPC produced. This aspect of research, therefore, is aimed at cost reduction and improved functional properties.

BCF completed and submitted a petition to FDA (Food and Drug Administration) to use a large number of fish species for FPC manufacture. Data for this petition were obtained by using samples produced in the model scale unit by a modification of the BCF solvent extraction procedure. The extensive analytical and nutritional data provided FDA demonstrated that FPC will meet present FDA requirements when made from a number of kinds of fish.

The model scale unit has been used to process several species of fish, such as anchovy and menhaden, to provide FPC samples for testing in connection with the petition to FDA. Plans have been made to modify this batch model scale unit for continuous operation. When modified, this unit can be effectively used in engineering research to lower the cost and increase the efficiency of the FPC process.

BCF also studied the use of enzymes to produce FPC and developed information on the process for making FPC by hydrolysis methods—specifically with endogenous or added enzymes.

After several years of concerted effort, BCF made a significant improvement in the assay that uses the growth of chickens as a measure of protein quality. The improved technique will be used as a standard in developing a quick chemical test for estimating accurately the quality of fish meals.

BCF also made two other successful studies. One was an intensive study of availability and body assimilation of amino acids from fish meals. The other was a detailed study of the variations in chemical and nutritive contents of menhaden fish solubles throughout the 1969 fishing season. These data will assist the animal feeding industry in its formulation of feeds.

Fishery product publicity.—BCF's Division of Marketing maintains a consumer educational program to advise the public of fishery products in plentiful supply, methods of preparation, quality maintenance, and handling. Each month about 1,000 newspaper food editors receive consumer educational materials from the Division of Marketing's central mail facility in Chicago.

The Division of Marketing released three publications in 1969. "Seafood Moods," a 30-page Government Printing Office sales document in full color, features fishery products from Alaska, Wash-

ington, and Oregon. The "Big Fish-In" is a 38-page recipe booklet that accompanies a 25-minute film strip by the same title for use in the National School Lunch Program. A 15-page manual that gives the cost per portion for Type A school lunches was released nationally.

BCF research home economists made 798 recipe tests and 748 yield tests for school lunch, institutional, and consumer applications. They also issued 46 school lunch menus and 23 school lunch marketing guides. Information provided by BCF home economists was released nationally through 81 news releases and publications.

In cooperation with several Gulf States, BCF produced two new fishery educational films. "Estuarine Heritage" and "The Biologist and the Boy" are now in national distribution through 200 film libraries. About 5 million people view BCF films annually on 26 different fishery subjects. An estimated 20 million additional people see the films through public service television broadcasts. BCF's Audio Visual Services Unit received eight national and international awards for creative excellence in 1969.

Fishery statistics.—BCF's Division of Statistics and Market News assembled data on fisheries for the 46 States that had commercial fishing in 1969. These statistics include numbers of commercial fishermen, fishing craft and gear, as well as quantity and value of the catch by species and gear, production of processed fishery commodities, and imports and exports of fishery products. In 1969, 306 current fishery statistical publications (1,961 pages) were sent to private industry and Government agencies in the United States, foreign industry and government, and U.S. embassies. In addition, considerable data were supplied as news releases for the Fishery Market News reports. Seven Market News field offices at principal fishing ports served as information centers for the U.S. fishing industry. With cooperation of State fishery agencies, data on landings were published monthly for 19 States. Also printed monthly was information on production of fish meal, oil, and solubles; freezings; and cold storage holdings of fish and shellfish. Data on monthly production of fish sticks, fish portions, and breaded shrimp were released quarterly.

Inspection and certification program.—BCF provided continuous inspection and certification services to 35 processing plants on a cost-reimbursable basis. Fifty-six inspectors inspect 298 million pounds (edible weight) of fishery products. In addition, 13 lot inspection stations provided inspection services to 22 States and various State and Federal agencies that use U.S. Department of

Interior inspection when they buy fishery products. These stations inspected 39 million pounds of products.

To provide the fishing industry with inspection services at an economical cost, BCF cross-licensed 40 inspectors from other Federal inspection agencies to sample and inspect products for quality and condition.

Market News Service reporting.—In 1969, eight BCF Fishery Market News Service offices, strategically located in important fish production and consumption areas, collected marketing information and data on a wide range of fishery products. Through daily mimeographed "Fishery Market News Reports," seven field offices provided members of the fishery industry (fishermen, wholesalers, retailers, and other interested persons) with timely information on supplies, receipts, shipments, foreign trade, market conditions, and prices on more than one hundred fishery products. They also provided industry members with U.S. and foreign fishery news items, information on Government legislative actions relating to fisheries, and periodic summaries and other reports. The reports, disseminated widely by the field offices, provide current market information and other data that are important for ensuring competitive freedom and efficiency in the orderly marketing of fishery products.

Fishery marketing information and related data, collected currently, provide an accumulation of records that are valuable in analyzing past performances and for projecting trends in the fisheries.

Standards and specifications.—At the request of members of the fishing industry, BCF develops standards for use in the voluntary inspection and certification of fishery products. Since 1956, BCF has developed voluntary U.S. grade standards for 16 fishery products. It is developing two more standards, one for frozen raw scallops and the other for fresh and frozen dressed catfish.

Transportation.—BCF's transportation economist continued to work with shippers, box manufacturers, and BCF technologists in developing new ways to ship fish products. He also studied transportation rates for fishery products and used the results of these studies to help obtain equitable rates for fishery products.

Water resource developments.—During 1969, the entire water resources and river basin staff of BCF participated in the National Estuary Protection Act Study with the Bureau of Sport Fisheries and Wildlife. A final draft of the study report was finished. The study documents the critical need to protect and conserve the estuarine environment and suggests a course of action to do so.

Fisheries Financial Assistance Programs

To aid the U.S. fishing industry in 1969, BCF continued to administer three financial assistance programs and began a new program. These programs are the Fisheries Loan Program, the Fishermen's Protective Fund Program (begun in 1969), the Fishing Vessel Construction Differential Subsidy Program, and the Fishing Vessel Mortgage and Loan Insurance Program. A report of the activities under each program follows.

Fisheries Loan Program

The Fisheries Loan Program continued operations that began in the latter part of 1956. Public Law 89–85, enacted July 1, 1965, authorized continuation of this program; it extended the life of the Fisheries Loan Fund to June 30, 1970, and expanded the purposes for which loans may be made. Loans may be made for financing or refinancing the cost of purchasing, constructing, equipping, maintaining, repairing, or operating new or used commercial fishing vessels or gear under certain restrictions. The applicant must be a U.S. citizen, possess ability, experience, resources, and other qualifications necessary to operate successfully and show that reasonable financing is not otherwise available. During fiscal year 1969, 145 applications totaling $5,519,216 were received and 71 for $2,408,958 were approved. The total since the program began is 2,259 applications for $62,783,447; of these, 1,187 for $29,002,714 were approved.

Fishermen's Protective Fund Program

The Fishermen's Protective Fund Program began in 1969 as authorized by Public Law 90–482 and approved August 12, 1968. This legislation amended the Fishermen's Protective Act of 1967 and is administered by the Secretary of State and the Secretary of the Interior. Under section 7 of the enabling legislation, an owner of a vessel of the United States may enter into a Guarantee Agreement with the Secretary of the Interior to provide for reimbursement of certain losses and costs incurred as a result of the seizure of the vessel by a foreign country on the basis of rights or claims in territorial waters or on the high seas which are not recognized by the United States. The regulations were adopted January 27, 1969. By June 30, 1969, 45 vessel owners had entered into Guarantee Agreements with the Secretary of the Interior.

Fishing Vessel Construction Differential Subsidy Program

Public Law 86–516 authorized the Fishing Vessel Construction

Differential Subsidy Program that began in 1960; Public Law 88–498, approved August 30, 1964, amended Public Law 86–516. The latter legislation modified the subsidy program, increased the amount of subsidies that may be paid from 33⅓ percent to 50 percent of the domestic cost, and authorized the acceptance of applications through June 30, 1969. The Congress appropriated $6 million to carry out the purposes of the act during fiscal year 1969. To qualify for a subsidy, a vessel must meet certain requirements. It must be of advanced design that will enable it to operate in expanded areas, be equipped with newly developed gear, and must not operate in a fishery if such operation would cause economic hardship to efficient vessel operators already in that fishery. A public hearing is required on each application before a finding of eligibility can be made. The first applications under this revised program were received after regulations were adopted in December 1964. As of June 30, 1969, BCF received under the expanded program 119 applications for subsidies estimated at about $32,191,100. Of these, 71 were from New England, 16 from the Gulf coast area, 19 from California, 11 from Seattle, Wash., and 2 from Alaska. After hearings, 60 of these applications were approved, and by June 30, 1969, construction contracts were made for 32 vessels involving subsidies of $18, 604,748.

Fishing Vessel Mortgage and Loan Insurance Program

This program provides Government insurance for mortgages given by lending agencies to construct, reconstruct, or recondition fishing vessels. During 1969, 22 applications for insurance totaling $7,441,041 were received and brought the total applications to 240 for $31,837,977. During 1969, 20 applications involving $3,937,449 were approved, and 11 for $4,262,401 were pending June 30, 1969. Since this program began in 1960, the Department of the Interior has approved 199 applications for $24,198,828. Vessel owners and lending agencies continued interest in this program throughout 1969, although high interest rates and shortages of funds reduced the number of applications received.

American Fisheries Advisory Committee

The American Fisheries Advisory Committee consists of key members of the commercial fishing industry. The Secretary of the Interior appoints these members under provisions of the Saltonstall-Kennedy Act of July 1, 1954. The function of the Committee is to submit to the Secretary advice and recommendations on the matters relating to the commercial fishery programs in the De-

partment of the Interior. The Committee met in Washington, D.C., May 5 to 6, 1969.

Appendix D lists the Committee members in 1969.

New Programs

BCF began two new research programs in 1969. One program concerns efficiency in harvesting the U.S. commercial fishery resources, and the other concerns movement of fishery products throughout the world.

Barriers Affecting the Efficiency of Harvesting

A major new program was the investigation of the economic, social, and political barriers that affect the harvesting of U.S. commercial fishery resources. Working with universities, BCF economists plan to identify all the laws, rules, and regulations for each major fishery and develop an alternative regulatory system. They will also determine the benefits and costs associated with each of the barriers and with the alternative regulatory system.

Movement of Fishery Products Throughout the World

A study of the worldwide trade in fishery products will help economists determine how changes in trade policy in foreign countries affect U.S. trade in fishery products.

Meetings

Participation in international meetings is becoming increasingly important as the developed nations of the world expand their fishing efforts to all ocean areas and as developing nations increase their efforts to develop their own fisheries. BCF officials participated in many of the international conferences and meetings. Their chief purposes in attending were to urge policies and gain knowledge that would benefit the U.S. fishing industry. Their participation includes presentation of scientific reports and preparation of background papers and position papers.

Subjects discussed at these meetings included various FAO (Food and Agriculture Organization of the United Nations) activities; the programs for sea lamprey control and stocking lake trout and salmon; quota for yellowfin tuna; conservation of Atlantic tunas; regulations for the haddock and red and silver hake fisheries in the Northwest Atlantic; conservation of salmon, halibut, and herring in the eastern North Pacific and eastern Bering Sea; management of the halibut fishery in the Northeastern

Pacific including the eastern Bering Sea; management of sockeye and pink salmon of the Fraser River system; quota for whale catch in the Antarctic; research on North Pacific fur seal resources; and studies of fish protein concentrate production.

A summary of the work done at these meetings follows:

FAO (Food and Agriculture Organization of the United Nations)

In 1969, FAO advanced its work through various meetings of such groups as its COFI Sub-Committee on Development of Cooperation with International Organizations Concerned with Fisheries, Committee on Fisheries, Conference, Conference of Plenipotentiaries on the Living Resources of the Southeast Atlantic, Fishery Committee for the Eastern Central Atlantic, and two technical committees.

COFI Sub-Committee on Development of Cooperation with International Organizations Concerned with Fisheries.—The Sub-Committee at its second session January 14 to 17, 1969, at Rome, Italy, noted that the Indian Ocean Fishery Commission and the FAO Fishery Committee for the Eastern Central Atlantic have been established as sea-area commissions under different provisions of the FAO Constitution and General Rules. They, therefore, decided not to propose a second attempt to amend Article VI of the FAO Constitution.

Committee on Fisheries.—At the fourth session of the Committee on Fisheries April 17 to 23, 1969, at Rome, Italy, leading fishery officials of many nations discussed international fishery problems, including cooperation among all international organizations dealing with ocean affairs in line with UN Resolution 2172 and related resolutions. They considered also the inland waters of Africa and several areas or stocks that need international cooperation for conservation or development.

The Committee noted the establishment of sea-area commissions in the Indian Ocean and in the eastern central Atlantic and formation of the IMCO/FAO/UNESCO/WMO Joint Group of Experts on Scientific Aspects of Marine Pollution (GESAMP).

Fishery experts commented upon and reviewed the proposed Department of Fisheries Program of Work and Budget for 1970–71 and a Summary Fisheries Chapter of the Indicative World Plan. Particularly important to most member nations are FAO's role as a clearinghouse for scientific knowledge and the Department's work aimed at developing fishing industries in developing countries.

The Committee approved reorganization of the Department of Fisheries and reiterated its support for vertical organization of the Department.

Conference.—As approved by the 51st session of the FAO Council, the new Technical Committee on Field Programs and the new Technical Committee on Areas of Concentration met October 30 to November 5, 1969, at Rome, Italy. At its 15th session October 30 to November 27, 1969, at Rome, Italy, the Conference agreed that although the first technical committee provided a long-needed forum for discussing FAO policies and procedures on field operations, the second committee was unsuccessful. The Conference asked the Council to review again the organization of technical committees.

Fishery participation was difficult for all concerned because fisheries was never a specific item for discussion. Various countries, therefore, spoke about fisheries under all items, but the largest concentration of fishery talk was in the area of "Filling the Protein Gap."

The portion of the Program of Work and Budget, 1970–71, for the Department of Fisheries was briefly discussed in Commission II of the Conference. The work of the Department was supported, and most of the nations that spoke regretted that the growth rate of the Department, endorsed by the 13th session of the Conference, has not been maintained. The reorganization of the Department to include the Fishery Industries Division was approved to become effective January 1970.

An agenda item on "Fishery Problems" in Commission I provided the only opportunity for the large number of high-level officials at the Conference to discuss FAO activities related to fisheries.

Different countries suggested during the Conference that the Committee on Fisheries be enlarged to include all FAO member nations that wish to attend.

Conference of Plenipotentiaries on the Living Resources of the Southeast Atlantic.—At its meeting October 14 to 23, 1969 at Rome, Italy, the Conference drafted a convention that will establish an international commission for this ocean area.

Fishery Committee for the Eastern Central Atlantic.—The Committee at its first session March 23 to 28, 1969, at Accra, Ghana, emphasized the problems of management and conservation of the resources of this ocean area. Improved statistics are important to stock assessment work. A working group was proposed to consider these problems. Of the 26 nations invited to become mem-

bers, 23 have done so, and 19 of these nations attended the first session. By selecting the nations that may become members, the Committee has alleviated the political problems that may have prevented it from functioning effectively.

Two technical committees.—The Technical Conference on Fish Inspection and Quality Control was held in Halifax, Nova Scotia, Canada, July 15 to 25, 1969. There were technical discussions of improvements in processing techniques to control quality of fishery products. The Conference drew 300 people from 45 nations. The other conference was the Technical Conference on Investments in Fisheries in Rome, Italy, September 18 to 25, 1969. Preliminary steps and developments to encourage foreign investments were discussed. The attendance was 140 people from 42 countries and 9 international organizations.

Great Lakes Fishery Commission

The major issue at the 14th annual meeting of the Great Lakes Fishery Commission June 17 to 19, 1969, at Niagara Falls, N.Y. (U.S.A.), was the budget for sea lamprey control. This budget had been virtually the same since fiscal year 1964, although the Commission has continuously sought more funds. For fiscal year 1970 the Commission approved a budget of $1,898,100, which is an increase of $339,600.

Because of a lack of funds, it has not been possible to make a thorough survey to locate areas that are contributing to parasitic populations of lampreys in the upper lakes. The lamprey population is still high enough to hinder seriously any efforts to rehabilitate the stocks of valuable commercial and sport fish.

In past years, the United States, through the Department of State budget, has not been able to meet its share of the Commission's budget (United States 69 percent, Canada 31 percent), whereas Canada has maintained its share. This year, however, through the efforts of many officials of the States and others, a $200,000 addition to the budget for lamprey control has been approved and will enable the United States to pay its share. This sum will make the much-needed research and lamprey control operations possible.

At the interim meeting of the Commission December 2 to 3, 1969, at Ann Arbor, Mich., items of principal concern were the sea lamprey program, the program of stocking lake trout and salmon, and Michigan's new zone management plan. Scientists stated that lampreys are believed responsible for failure of planted lake trout to spawn.

IATTC (Inter-American Tropical Tuna Commission)

At its 21st annual meeting at San Diego, Calif., March 18 to 22, 1969, the Commission recommended the initiation of a 3-year program of experimental overfishing, designed to test present assessment of the yellowfin tuna stock. The quota was set at 120,000 short tons, with the reservation that if the catch rate fell below 3 tons per day of fishing the fishery would be closed. Another feature of the Commission's actions was the reservation of 4,000 short tons for the small vessels of each contracting party (a "small" vessel is one with a capacity of less than 300 tons).

The open season for yellowfin tuna fishing opened January 1, 1969, and closed April 16, 1969, when the quota, with allowances for incidental catches, was filled. A new element of the fishery for 1969 was increased fishing in the eastern Pacific outside the regulatory area. Additionally, more United States flag vessels than before, 23 in number, fished off West Africa after the season was closed in the eastern Pacific. During 1969, the U.S. flag tuna fleet continued to grow; 12 vessels with an aggregate capacity of 7,800 tons entered the fishery.

ICCAT (International Commission for the Conservation of Atlantic Tunas)

ICCAT held its first session December 1 to 6, 1969, in Rome, Italy. The member countries represented at the meeting were Brazil, Canada, France, Ghana, Japan, Morocco, Portugal, Republic of South Africa, Spain, and the United States. ICCAT was organized under a convention signed May 14, 1966, and entered into force March 21, 1969. The goals of the convention are to maintain populations of tuna and tunalike fishes in the Atlantic Ocean that will permit the maximum sustainable catch for food and other purposes.

The first session of ICCAT was concerned primarily with organizational questions. Rule of Procedures and Financial Regulations were adopted. With representation from all member countries present at the first session, a council was set up to serve as an executive body between the biannual sessions of ICCAT. It was agreed that the council should hold its first regular meeting in November 1970. Four panels were established within ICCAT to keep specified stocks of tuna under review. These panels are authorized to propose to ICCAT, upon the basis of scientific information, recommendations for joint action by the contracting parties.

ICCAT gave particular attention to the need to obtain more information about tuna stocks in the Atlantic and the fisheries

that harvest them. ICCAT recommended that its members take steps to provide detailed data on their tuna fisheries. It also urged member countries to intensify their investigations of Atlantic tuna resources. To help coordinate these activities, ICCAT set up a Standing Committee on Research and Statistics composed of scientific specialists of member countries.

These structural arrangements should facilitate efforts of ICCAT to achieve its basic goal of conservation.

ICNAF (International Commission for the Northwest Atlantic Fisheries)

At its 19th annual meeting in Warsaw, Poland, June 2 to 7, 1969, ICNAF approved proposals for (1) regulating the haddock fishery in Subarea 5 (Georges Bank) and Subarea 4, Division 4X (Browns Bank) and (2) regulating the red and silver hake (whiting) fishery in Subarea 5. These regulations will enter into force January 1, 1970.

The new haddock regulations will apply in 1970, 1971, and 1972 and set annual haddock quotas of 13,200 tons in Subarea 5 and 19,800 tons in Subarea 4, Division 4X. These measures are designed to allow limited fishing for haddock to continue, but at a level that will enable depleted stocks to begin rebuilding.

The hake regulation prohibits taking red hake and silver hake (whiting) during January-March of 1970, 1971, and 1972 in a section of Subarea 5 where concentrations of these species are found. The regulation supplements the protection that bilateral agreements provide for hake stocks in waters south of the ICNAF area.

ICNAF's action in effecting the haddock and hake measures is a very significant accomplishment. To further facilitate efforts to limit excess fishing intensity in the northwest Atlantic, ICNAF adopted an amending protocol to the ICNAF convention that would provide greater flexibility in types of fishery regulations that may be proposed by ICNAF. The amended protocol would allow ICNAF, for example, to propose allocation of catch or fishing effort quotas among member countries. This protocol will become effective after ratification by all member governments of ICNAF.

At the meeting, ICNAF also approved a proposal for prohibiting salmon fishing in the ICNAF convention areas in waters outside national fishery limits. Objections by certain countries, however, have prevented this measure from becoming effective for all members.

INPFC (International North Pacific Fisheries Commission)

INPFC is responsible for studying the need for conserving those North Pacific resources fished by two or more member countries (Canada, Japan, and the United States). Member countries agree to refrain from entering those fisheries that they have not previously engaged in when the resources are already being fully harvested, studied, and effectively managed. Under this provision, Canada abstains from fishing salmon in the eastern Bering Sea, and Japan abstains from fishing salmon in the eastern North Pacific and Bering Sea east of long. 175° W. Japan also abstains from fishing halibut and herring in certain areas. At its 16th annual meeting in Vancouver, British Columbia, Canada, November 3 to 7, 1969, INPFC did not recommend changes in these provisions.

The main issue facing INPFC at the meeting was that the South Koreans began to fish salmon in convention waters in 1969. If permitted to continue, this fishery will seriously affect the salmon conservation arrangement and the treaty. INPFC, therefore, agreed to ask member governments to take appropriate measures to deter the South Koreans from such fishing in the convention area. Fishing by the South Koreans will impair achievement of the convention's conservation objectives.

International Pacific Halibut Commission

The Commission held its 45th annual meeting in Seattle, Wash., January 31, 1969. The Commission, established under authority of a convention between the United States and Canada, investigates and regulates the halibut fishery in the Northeastern Pacific including the eastern Bering Sea.

At its 1968 annual meeting, the Commission expressed concern for failure of stocks in certain areas to respond to reductions in the catches in recent years. Because this trend has not been reversed, the Commission again recommended a further reduction of 2 million pounds in the catch limit for Area 2 (convention waters south of Cape Spencer, Alaska) and a reduction of 1 million pounds in Area 3A in the Gulf of Alaska (west of Cape Spencer).

The Commission also expressed concern about how increased trawling for other bottomfish will affect the stocks of halibut and called attention to the effect of trawling on the large population of juvenile halibut in the southeastern Bering Sea. It set aside a portion of this extensive area as a nursery area and again recommended that all fishing for halibut in this area be prohibited in 1969.

International Pacific Salmon Fisheries Commission

The Commission has the responsibility of (1) studying the sockeye and pink salmon of the Fraser River system for the purpose of recommending to the governments of the United States and Canada regulatory measures to maintain the resources at a high level on a sustained basis and (2) managing these salmon fisheries in the convention area to ensure that the fishermen of the two countries divide the catch equally.

At its annual meeting at Bellingham, Wash., December 16, 1969, the Commission reported that in 1968 the catch of sockeye salmon was 3.2 million fish, of which U.S. fishermen landed nearly 1.6 million fish, and the catch of pink salmon was 1.8 million, of which U.S. fishermen caught about 950,000 fish. The pink salmon catch was less than half the predicted level of 4.4 million. Unfavorable ocean conditions are believed to have caused heavy mortality at sea and a poor return of adult salmon. For 1970, the Commission predicts a run of 6.8 million sockeye to the Fraser River and a total catch of 4.5 million.

The Commission plans to make extensive studies in 1970 on how to control the high mortality of sockeye salmon caused by columnaris and bacterial gill diseases. The prespawning mortality caused by these myxobacteria has exceeded 50 percent in some systems in past years.

IWC (International Whaling Commission)

At its 21st annual meeting at London, England, June 23 to 27, 1969, IWC reported encouraging progress with several problems. The agreed quota for Antarctic baleen whales was reduced from the 1969 level of 3,300 BWU (blue whale units) to 2,700. This quota is still higher than the latest estimate of sustainable yield—2,500 BWU. The prohibition on killing blue and humpback whales in the North Atlantic has been extended for another 3 years. This prohibition is also in effect for these species in the Antarctic and the North Pacific. The North Pacific whaling nations (Canada, Japan, U.S.S.R., and the United States) agreed to try to implement the International Observer Scheme in 1970. The Scientific Committee agreed to meet in early 1970 to review methods of assessing the stock of fin whales, because figures from various countries differ on the present sustainable yield.

The U.S. interest in whaling is minimal when compared to other U.S. fisheries. The United States, however, plays a leading role in IWC deliberations because IWC is an important forum for promoting U.S. views on conservation.

North Pacific Fur Seal Commission

The North Pacific Fur Seal Commission held its 12th meeting in Tokyo, Japan, February 24 to 28, 1969. The Commission's research is directed toward achieving the maximum sustainable yield from the fur seal resource with due regard for other living marine resources, toward improving the quality of sealskins, and toward finding the most effective method of killing the seals. The Commission's Standing Scientific Committee began its meeting February 17. It reviewed research activities carried out by each country in 1968 and made recommendations to the Commission for further research to be done in 1969.

The Commission reported that during 1968 the U.S.S.R. took 14,978 skins of fur seals on the breeding islands for commercial purposes and the United States harvested 57,589 skins. As provided by the convention, Canada and Japan each received 15 percent from both groups of skins.

UNIDO (United Nations Industrial Development Organization) Expert Group Meeting on Fish Protein Concentrate

This meeting was held in Agadir, Morocco, December 15 to 19, 1969. Two BCF scientists gave papers on analysis, testing methods on use of FPC, and other aspects of FPC production.

Cooperation and Coordination with International, Federal, State, and Other Agencies

Through cooperation with various foreign governments, other Federal agencies, States, universities, and private organizations, BCF profits from the facilities and skills of these cooperators and the exchange of ideas and results. BCF also coordinates many of its programs with these groups.

Cooperation with International Groups

Cooperation enables international groups to solve mutual problems by developing and exchanging needed information. International organizations, such as Food and Agriculture Organization of the United Nations, Great Lakes Fishery Commission, International Commission for the Northwest Atlantic Fisheries, International North Pacific Fisheries Commission, and North Pacific Fur Seal Commission, coordinate the research efforts of many countries including the United States.

In 1969, BCF participated in the work of the Codex Alimentarius Commission, the Foreign Currency Research Program, and the United Nations Development Program.

Codex Alimentarius Committee on Fish and Fishery Products.—At its third meeting at Bergen, Norway, October 7 to 11, 1968, the Committee discussed commodity standards (Codex) for a number of fishery products and the principles for development of these Codex standards. The standard for canned Pacific salmon was adopted at the sixth session of the Codex Alimentarius Commission at Geneva, Switzerland, March 3 to 14, 1969, and the standard now goes to countries for adoption. The standards (initially authored by the United States) for canned shrimp and prawns and frozen gutted Pacific salmon are now at step 8 and will be submitted to the Commission for adoption.

Three standards for frozen fillets of ocean perch, plaice, and cod and haddock are at step 5, which is the midpoint of the procedure for developing standards. Proposed tables of defects for these standards are being tested in conjunction with a Codex sampling plan for prepackaged products, which has been moved to step 5 of the procedure.

Foreign Currency Research Program (Public Law 480).—As provided in section 104(b) (3) of Public Law 480, BCF undertakes fishery research projects in cooperation with institutions in foreign countries. During 1969, research was carried out on five projects in India and Israel, and a number of scientific papers useful to BCF scientists were translated in countries with excess foreign currency. BCF obligated $11,512 during 1969; $1,640,273 has been obligated since the fishery research program began in 1962.

Research carried out in India in 1969 concerned herringlike fishes, catfish, and river fish. The Marine Biological Station, Annamalai University, Portonovo, South India, submitted a final report on the project dealing with identification of herringlike fishes of the Indian Ocean. The report describes and identifies fishes of the genus *Ilisha* and lists the species of herringlike fishes found during the project. This work will help eliminate the confusion in identifying these species in the Indian Ocean.

At the University of Delhi, project researchers continued work on how the ovary of catfish responds to variables of light and temperature.

Scientists at the University of Calcutta carried out intensive studies of fish life, habitat, and fish food organisms in torrential rivers of West Bengal.

Israeli researchers with the Hebrew University continued work on fish genetics to improve fish farming practices. They have carried out crossbreeding and inbreeding experiments and have developed methods to separate the influence of environmental factors on growth. Testing of genetic strains was done simultaneously in ponds and wire cages.

BCF has one of the world's most comprehensive programs for translating foreign fishery and oceanography literature. Because of this program, which began in 1947 as a clearinghouse for translations, duplication in research and translation in many instances has been avoided, and savings in research effort and funds have been accomplished through timely translation of material. This program benefits academic groups, the Federal Government, industry, State agencies, and foreign research laboratories. During 1969, 1,100 articles, books, and scientific papers (18,210 pp.) were translated, and over 16,000 copies of the translations distributed. Translations are being made in India, Israel, Poland, Tunisia, and Yugoslavia.

UNDP (*United Nations Development Program*).—BCF's Office of Technical Assistance furnished technical personnel for programs in Brazil and Indonesia. A BCF employee successfully directed the UNDP/FAO Fishery Research and Development Project in Brazil. The project stimulated the complete reorganization of Brazil's fishery agency and its fishery laws and was instrumental in attracting over $150 million of new investment in the fishing industry of Brazil.

BCF also lent UNDP one of its staff to head a fishery mission to Indonesia. The mission recommended support by UNDP of a 4-year training and development project to increase the impact of fisheries on Indonesia's economy and nutrition.

Cooperation with Federal Agencies

BCF has formal and informal agreements with other Government agencies—Agency for International Development; Atomic Energy Commission; Department of Agriculture; Department of Commerce (including the Bureau of Census and the Weather Bureau); Department of Defense; Department of Health, Education, and Welfare; Department of Labor; Department of State; Department of the Treasury; Economic Development Administration; and Federal Trade Commission.

A few of the cooperative efforts are listed here. BCF helped in several projects of the Agency for International Development. It also continued the cooperative BCF-Atomic Energy Commission

program; worked closely with the Department of Agriculture in scheduling and promoting U.S. foods at international food fairs; and participated in the Economic Development Administration's program on projects related to commercial fishing activities in economically depressed areas throughout the United States.

AID (Agency for International Development).—In 1969, BCF assisted AID with the quality problem of FPC (fish protein concentrate). AID's effort to acquire about 900,000 tons of FPC under contract from a private company that used the patented two-stage VioBin process did not meet expectations. Of the 450 tons offered AID, only 62 tons met all specifications of the contract. BCF's Fishery Products Inspection Service found the major deficiency of the product was the nutritional quality level of the product. In the lots not accepted the quality was about 90 percent of the specified standard. Because they recognized that a quality problem existed, AID and the company requested technical advice from BCF. Using knowledge gained from studies on nutrition and on the IPA (isopropyl alcohol) system, which differs from that used to produce FPC, BCF offered a number of potentially corrective measures.

BCF's Office of Technical Assistance supplied services to AID and FAO in participant training for foreign nationals throughout the United States and furnished technical personnel for programs in developing nations.

The participant training program, funded by AID, is coordinated with AID and FAO training programs on a worldwide basis. In universities, BCF laboratories, or State fisheries agencies in almost every State, BCF supervised training of nationals of Brazil (6), Kenya (1), Korea (9), Indonesia (1), Nigeria (1), Pakistan (1), and Thailand (2). These 21 nationals, many of whom are prominent officials in their own countries, learned new skills in administration of fishery organizations, advanced mathematics, fishery biology, fishing methods and resources survey, marketing of fishery products, technology of processing, and many other technical subjects.

In technical assistance, BCF furnished the services of professional fisheries technicians in overseas projects. Two BCF employees, operating the BCF/AID Northeast Brazil Fishery Development Project, have spurred use of intensive fish culture techniques in drought areas of the country, thus providing additional food for the local population.

Atomic Energy Commission.—The staff of BCF's Exploratory Fishing and Gear Research Base at Seattle, Wash., continued the

cooperative BCF-Atomic Energy Commission program. The program is designed to study the pelagic fauna off the mouth of the Columbia River. The goals are (1) locating midwater concentrations of pelagic fish and invertebrates in the area, (2) determining the species composition and relative abundance of species in each concentration sampled, and (3) establishing guidelines for future pelagic surveys during winter. An echo-sounder survey was made along a predetermined trackline between 25- and 400-fathom depths. All significant echo signs at depths of 200 fathoms or less were sampled with both an Isaac-Kidd trawl and a monofilament midwater fish trawl. The dimensions and other characteristics of fish concentrations at greater depths were estimated from studies of the echo sounding.

USDA (Department of Agriculture).—BCF and the Foreign Agriculture Service, International Trade Division of USDA work closely together to promote U.S. fishery products at international food trade fairs and exhibits.

BCF also works cooperatively with USDA through the Plentiful Foods Committee by listing fishery products on the "List of Foods in Plentiful Supply" when a marketing imbalance occurs. USDA sends these lists to food buyers, publicists, and others. In 1969, the list featured canned salmon during January and February and Maine sardines in May.

Through mutual cooperation with USDA, the Department of Defense, and the Department of Health, Education, and Welfare, BCF information on home economics is distributed nationally to schools, military installations, dietitians, and food publicists. An effective means of releasing timely BCF home economics information is to send it to those who can pass it on to food trades and consumers. As an example, BCF prepared a section on fishery products that was printed in the 1969 USDA Yearbook of Agriculture, "Food for Us All."

Economic Development Administration.—BCF continued to participate in the program of EDA (Economic Development Administration), as provided for by the Public Works and Economic Development Act of 1965 (Public Law 89–136). At the request of EDA, BCF reviewed and evaluated several proposed projects related to commercial fishing activities in economically depressed areas throughout the United States. Recommendations were made for approval or denial of funding of the proposals.

Cooperation with States

BCF cooperates closely with two interstate commissions—Atlantic States Marine Fisheries Commission and the Gulf States

Marine Fisheries Commission. These Commissions coordinate the conservation actions and research efforts of the States involved in interstate compacts. Formal agreements provide for this coordinated action.

All coastal and inland States with commercial fisheries have cooperative arrangements with BCF for collecting and compiling fishery statistics.

Cooperation with Other Groups

BCF cooperates closely with numerous national, regional, and local fishery and allied trade associations. This cooperation uses BCF's development, research, and service functions.

Federal-State-industry marketing liaison.—A continuing part of the BCF marketing program is maintaining liaison among Federal, State, and industry marketing organizations. Once a year BCF solicits the marketing plans of all cooperative marketing organizations and compiles them into a report for distribution. Through this mechanism, each group is made aware of all major marketing plans for the year. BCF also organizes a joint meeting of all pertinent organizations every 6 months to discuss various plans, materials, and problems.

Organization, Employment, Budget, and Physical Properties

A summary of BCF organization, employment, budget, and physical properties in 1969 follows.

Organization

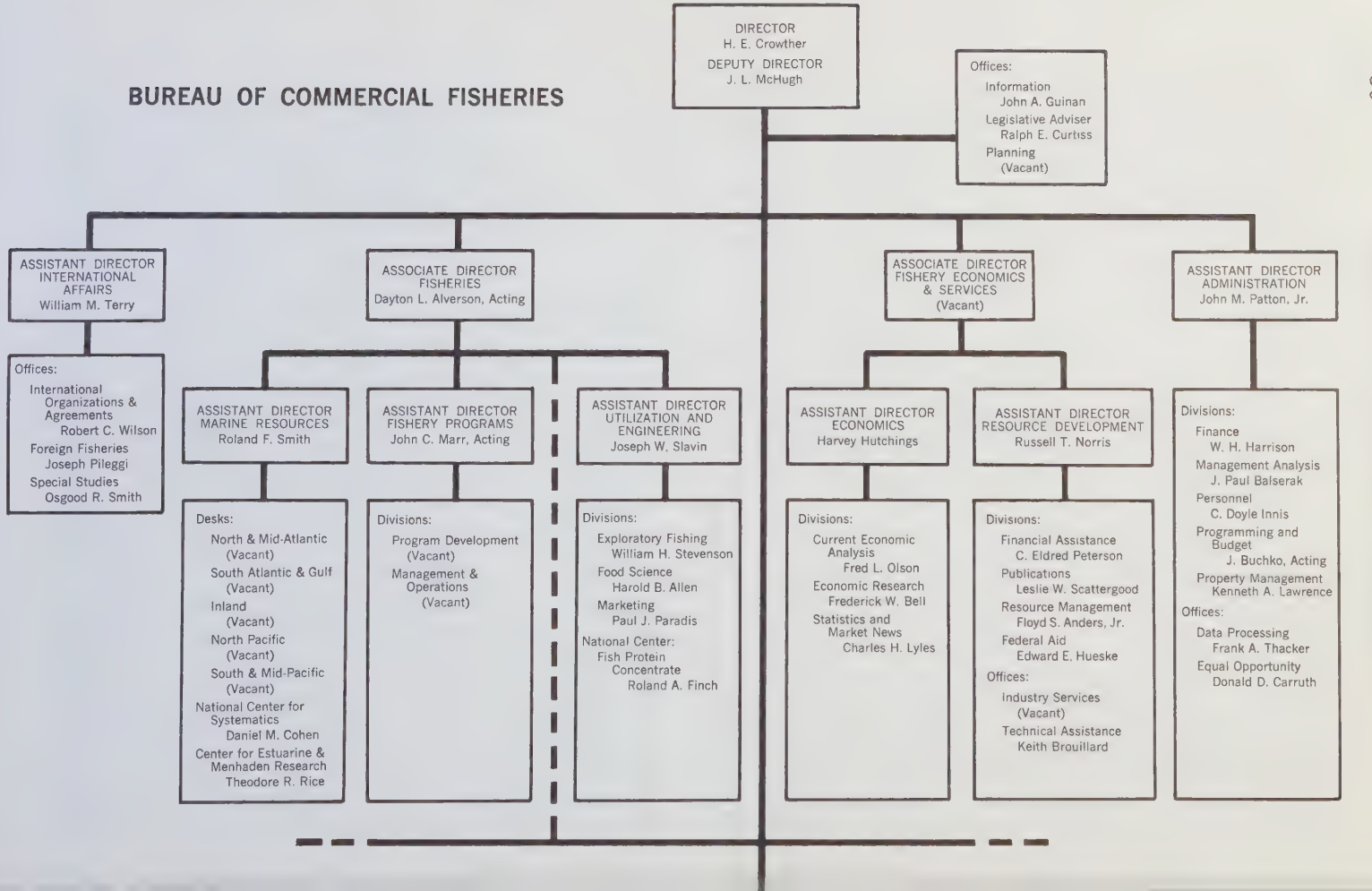
During 1969, efforts have been directed at implementing and improving the new organization that was put into effect in 1968. The Division of Foreign Trade and Economic Services, under the Assistant Director for Economics, was abolished and its functions and personnel were transferred to two already existing Divisions to reduce fragmentation of scarce talent to work on economic problems of the fishing industry.

A Fleet Numerical Weather Central Unit was established in Monterey, Calif., to work with the Navy's Fleet Numerical Weather Central to develop a fishery forecasting plan.

An Office of Economics was established in Region 1, Seattle, Wash., to assist in studying and identifying solutions to economic aspects of fishery problems.

The Biological Laboratory at Beaufort, N.C., under the Associate Regional Director for Fisheries, was combined with the Na-

BUREAU OF COMMERCIAL FISHERIES



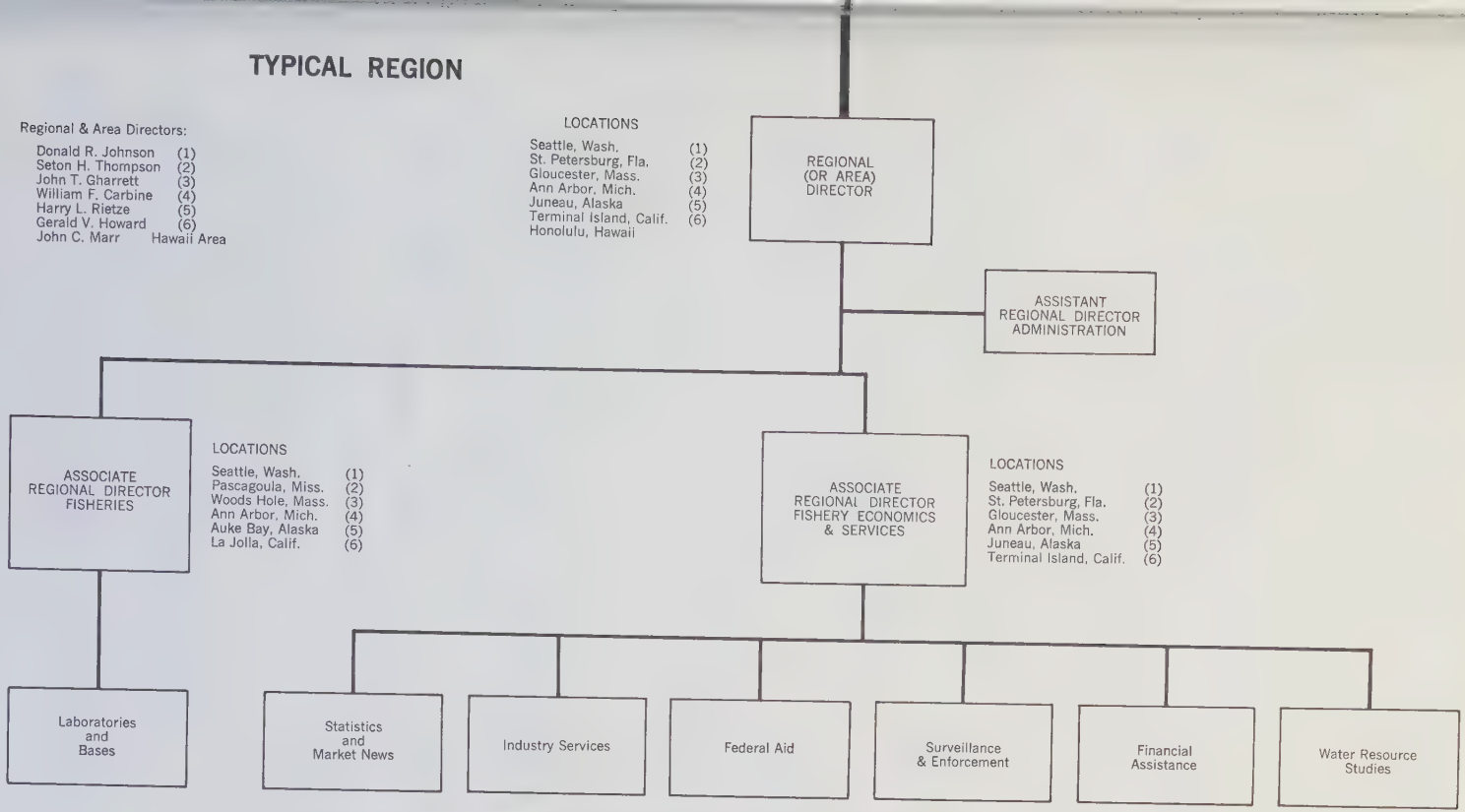


FIGURE 1.—Organization Chart, Bureau of Commercial Fisheries, December 31, 1969.

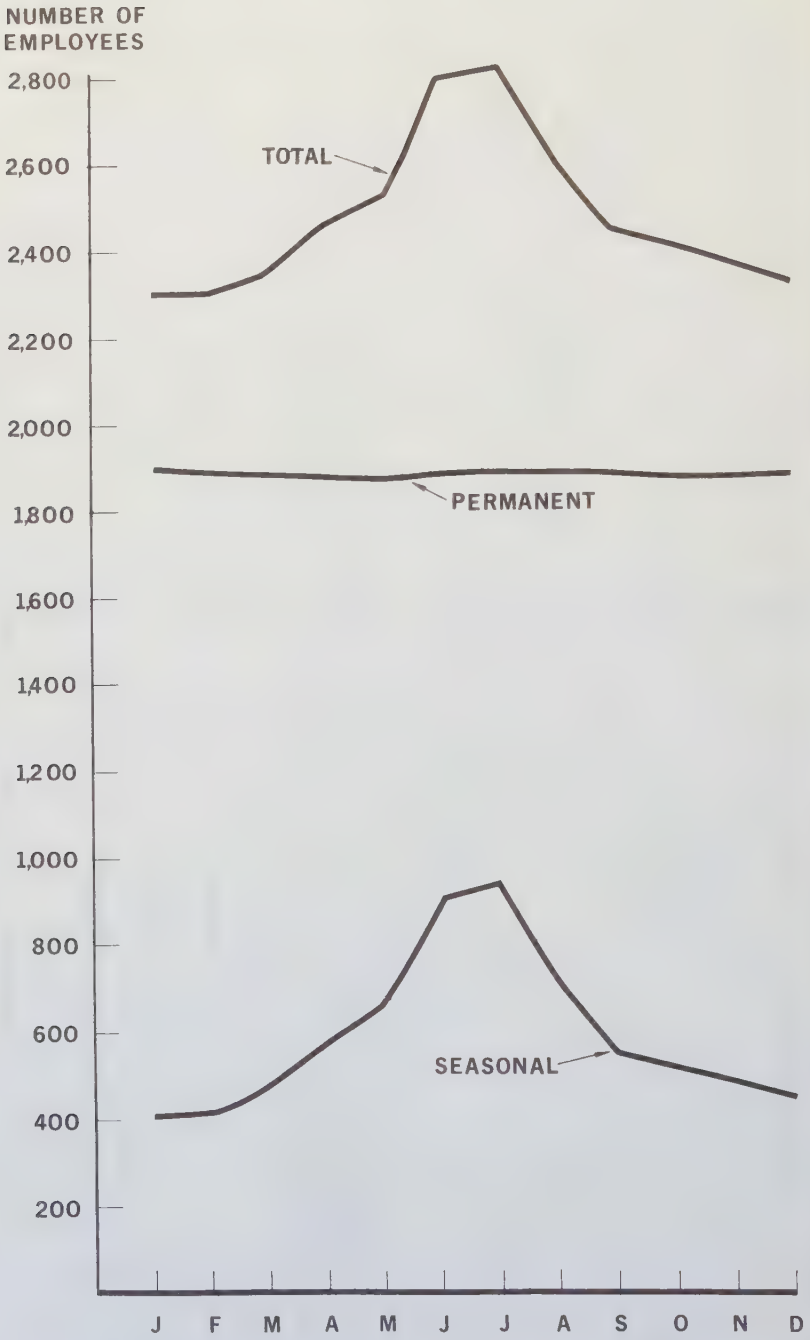


FIGURE 2.—Bureau of Commercial Fisheries employment totals by month, calendar year 1969.

tional Center for Estuarine Marine Resources. Special program and guidance on fishery matters will be supplied by the Associate Regional Director for Fisheries in Region 2.

The names of several divisions in the headquarters office were changed.

Figure 1 shows the organization of BCF as of December 31, 1969.

Table 1 shows the field organization of BCF as of December 31, 1969.

TABLE 1.—*Field organization of BCF as of December 31, 1969* [1]

Region 1, Seattle, Wash.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director
  - Biological Laboratory
  - Exploratory Fishing and Gear Research Base
  - Food Science Laboratory
  - Marketing Program
  - Technological Laboratory
- Fishery Economics and Services, Associate Regional Director
  - Columbia River Fishery Development Program, Portland, Oreg.
  - Columbia River Fishery Program (Field Station), Eugene, Oreg.
  - Columbia River Fishery Program (Field Station), Boise, Idaho
  - Enforcement and Surveillance Office
  - Federal Aid Office
  - Financial Assistance Office
  - Industry Services Office
  - Marine Mammal Resource Program (Pribilof Islands)
  - Statistics and Market News Office

Region 2, St. Petersburg, Fla.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director
  - Biological Laboratory, Beaufort, N.C.
  - Biological Laboratory, Galveston, Tex.
  - Biological Laboratory
  - Exploratory Fishing and Gear Research Station, Brunswick, Ga.
  - Exploratory Fishing and Gear Research Base, Pascagoula, Miss.
  - Marketing Program
  - National Center for Estuarine Studies (Headquarters Office), Beaufort, N.C.
  - National Center for Estuarine Studies (Field Station), Gulf Breeze, Fla.
  - Technological Laboratory, Pascagoula, Miss.
  - Tropical Atlantic Biological Laboratory, Miami, Fla.
- Fishery Economics and Services, Associate Regional Director
  - Federal Aid Office
  - Financial Assistance Office
  - Industry Services Office
  - Statistics and Market News Office, New Orleans, La.
  - Water Resource Studies Office

Region 3, Gloucester, Mass.

Regional Office, Regional Director
- Administration, Assistant Regional Director
- Fisheries, Associate Regional Director
  - Biological Laboratory, Milford, Conn.
  - Biological Laboratory, Boothbay Harbor, Maine
  - Biological Laboratory, Oxford, Md.
  - Biological Laboratory, Woods Hole, Mass.
  - Exploratory Fishing and Gear Research Base
  - Marketing Program, Boston, Mass.
  - Technological Laboratory
- Fishery Economics and Services, Associate Regional Director
  - Enforcement and Surveillance Office
  - Federal Aid Office
  - Financial Assistance Office

See footnote at end of table.

Industry Services Office
Safety Office, Boston, Mass.
Shellfish Advisory Service, Oxford, Md.
Statistics and Market News Office
Statistics and Market News Office, Boston, Mass.
Water Resource Studies Office

Region 4, Ann Arbor, Mich.

Regional Office, Regional Director
Administration, Assistant Regional Director
Fisheries, Associate Regional Director
Biological Field Station, Ludington, Mich.
Biological Field Station, Marquette, Mich.
Biological Field Station, Millersburg, Mich. (Hammond Bay)
Biological Field Station, Sandusky, Ohio
Biological Field Station, Mobridge, S. Dak.
Biological Field Station, Ashland, Wis.
Exploratory Fishing and Gear Research Base
Great Lakes Fishery Laboratory
Marketing Program
National Marketing Services Office (Headquarters Office), Chicago, Ill.
Technological Laboratory
Fishery Economics and Services, Associate Regional Director
Economics Office
Federal Aid Office
Office of Industry Services, Chicago, Ill.
Office of Statistics and Market News, Chicago, Ill.
Statistics and Market News Office
Water Resource Studies Office

Region 5, Juneau, Alaska

Regional Office, Regional Director
Administration, Assistant Regional Director
Fisheries, Associate Regional Director
Biological Laboratory, Auke Bay, Alaska
Exploratory Fishing and Gear Research Base
Facilities Planning and Maintenance
Technological Laboratory, Ketchikan, Alaska
Fishery Economics and Services, Associate Regional Director
Enforcement and Surveillance Office
Enforcement and Surveillance Office, Kodiak, Alaska
Federal Aid Office
Financial Assistance Office
River Basin Studies Office
River Basin Studies Office, Anchorage, Alaska
Statistics and Market News Office

Region 6, Terminal Island, Calif.

Regional Office, Regional Director
Administration, Assistant Regional Director
Fisheries, Associate Regional Director
Fishery-Oceanography Center, La Jolla, Calif.
Marketing Program
Ocean Research Laboratory, Stanford, Calif.
Technological Laboratory
Fishery Economics and Services, Associate Regional Director
Enforcement and Surveillance Office
Federal Aid Office
Financial Assistance Office
Foreign Reporting Office
Industry Services Office, Los Angeles, Calif.
Statistics and Market News Office

Hawaii Area, Honolulu, Hawaii

Area Office, Area Director
Administration, Assistant Area Director
Biological Laboratory

Field operations with headquarters offices in Washington, D.C.
Assistant Director for Economics and Services
National Home Economics Research Center, College Park, Md.
Assistant Director for Marine Resources
National Center for Estuarine Studies, Beaufort, N.C.
National Center for Systematics, Washington, D.C.
Assistant Director for Utilization and Engineering
National Center for Fish Protein Concentrate, College Park, Md.

[1] All laboratories and offices in same city as the Regional Office except as noted.

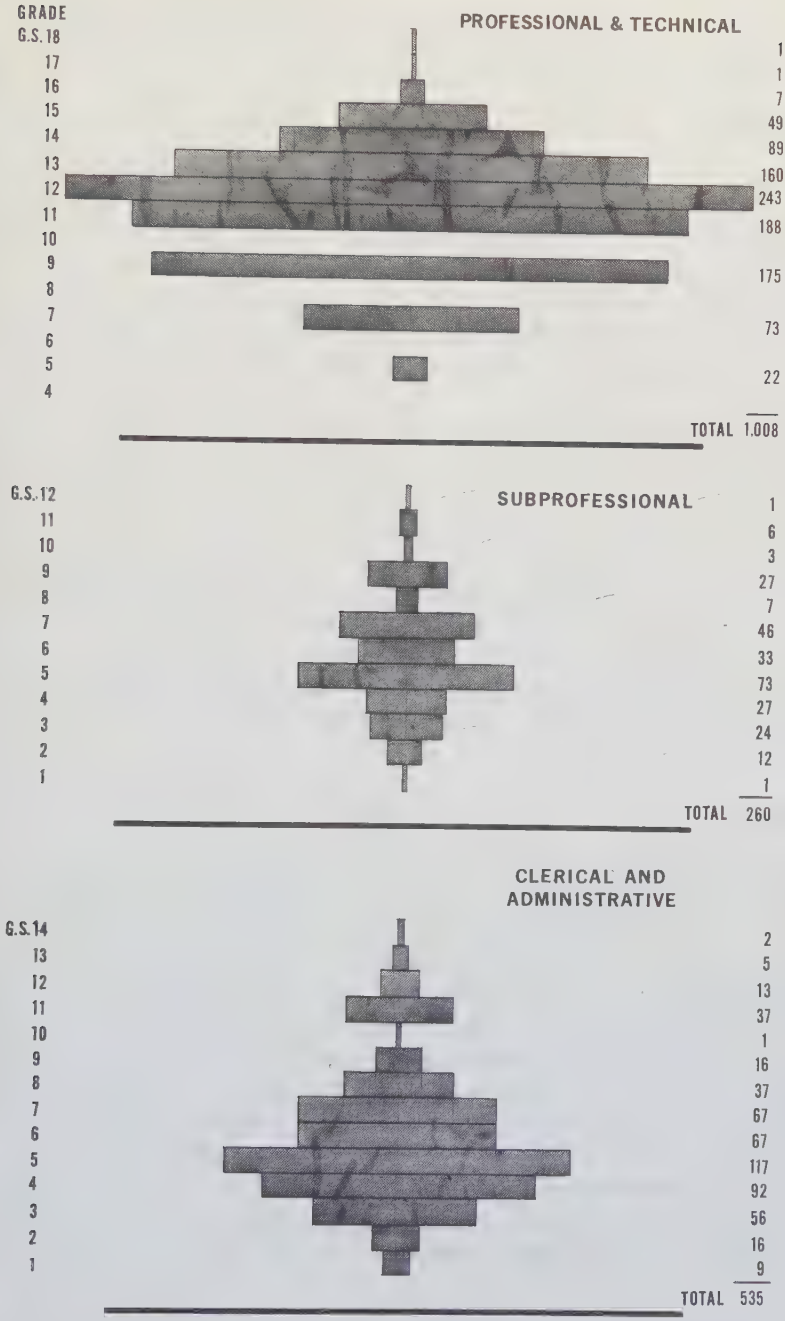


FIGURE 3.—Distribution by grade of professional and technical, subprofessional, and clerical and administrative employees, Bureau of Commercial Fisheries, October 31, 1969.

A map of the six regional and one area offices as of December 31, 1969, is shown in the frontispiece.

Employment

Employment for BCF averaged 2,475 throughout calendar year 1969 (1,881 permanent and 594 seasonal employees). The peak employment in 1969 was reported at the end of July when the staff was 1,883 permanent and 942 seasonal employees—a total of 2,825. Figure 2 shows the variations in the number of employees throughout 1969 and the relation between the total number and the number of permanent employees and seasonal, or temporary, employees.

BCF employees fall generally into four broad categories. Of the total 2,171 full-time employees reported as of October 31, 1969, 1,008 were classified in about 57 professional and technical series; 260 in 10 subprofessional series; 535 in 34 clerical and administrative series; and 368 were in positions, the pay of which is determined outside the Classification Act (191 vessel employees and 177 in other categories). Figure 3 shows the grade structures for the professional and technical series, subprofessional series, and the clerical and administrative series and the number of employees in each grade for these three classifications as of October 31, 1969.

Budget

The BCF's budget for fiscal year 1970 provides for a $64.7 million obligational program (app. F). Of this amount, $48.6 million were from annual appropriations; $8.2 million from the permanent appropriation under Public Law 83–466, as amended (known as the Saltonstall-Kennedy Act); $0.3 million from Pribilof Islands fur seal receipts for payment to Alaska; $0.9 million from the Great Lakes Fishery Commission for work in the Great Lakes; $0.8 million from the fishing industry for inspecting and grading fishery products; $2.3 million from other Federal organizations for reimbursable work, and $3.6 million from receipts under the revolving fishery loan fund.

Figure 4 shows the available funds to carry out BCF's program for each year from 1957 to 1969.

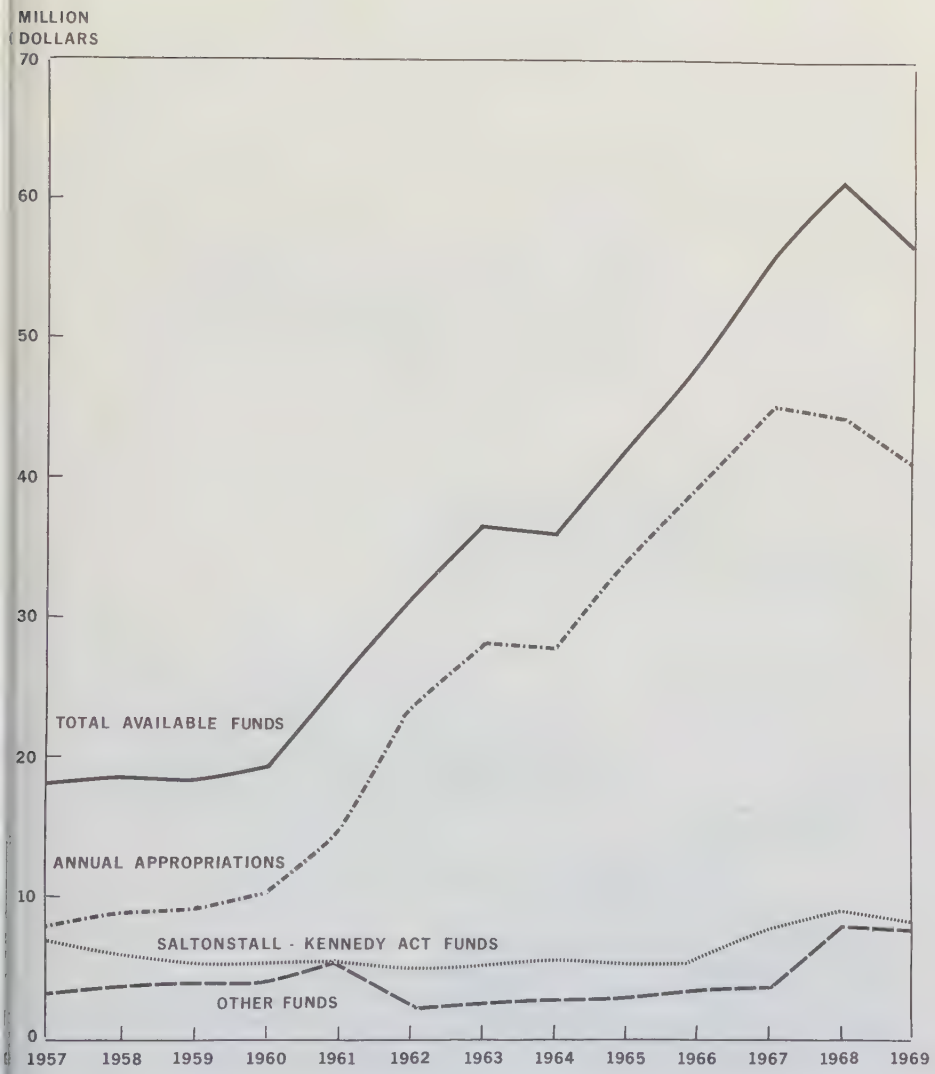


FIGURE 4.—Funds available to the Bureau of Commercial Fisheries, fiscal years 1957–69.

Physical Properties

The principal properties of BCF are field bases, laboratories, stations, vessels, and installations on the Pribilof Islands (app. G). BCF has 26 large laboratories and bases, 70 smaller stations and offices, and 28 vessels of 40 feet and longer. Figures 5, 6, and 7 show the principal BCF fishery biological research laboratories, and figure 8 shows the principal BCF exploratory fishing and gear research bases and technological laboratories.

Figures 9 and 10 show the principal fishery research vessels of BCF.

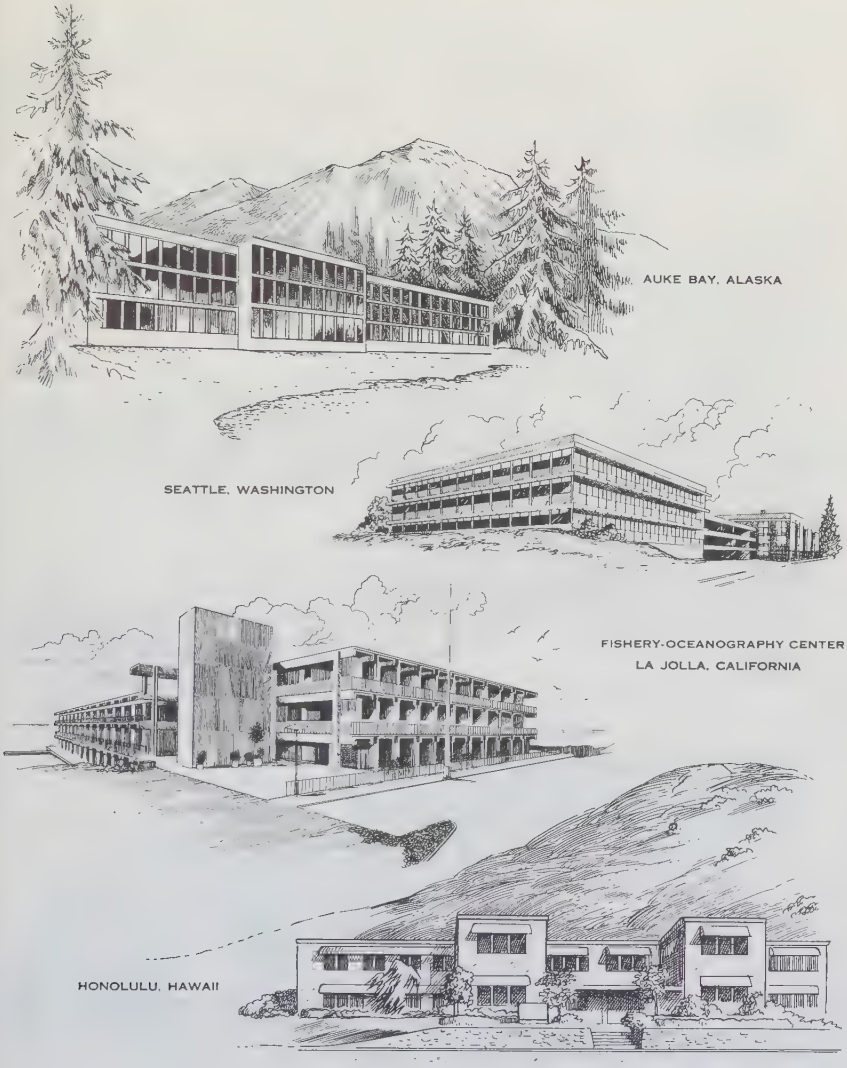


FIGURE 5.—Bureau of Commercial Fisheries Biological Laboratories, Pacific, 1969. The BCF Food Science and Technological Laboratories occupy the top floor of the new building in Seattle.

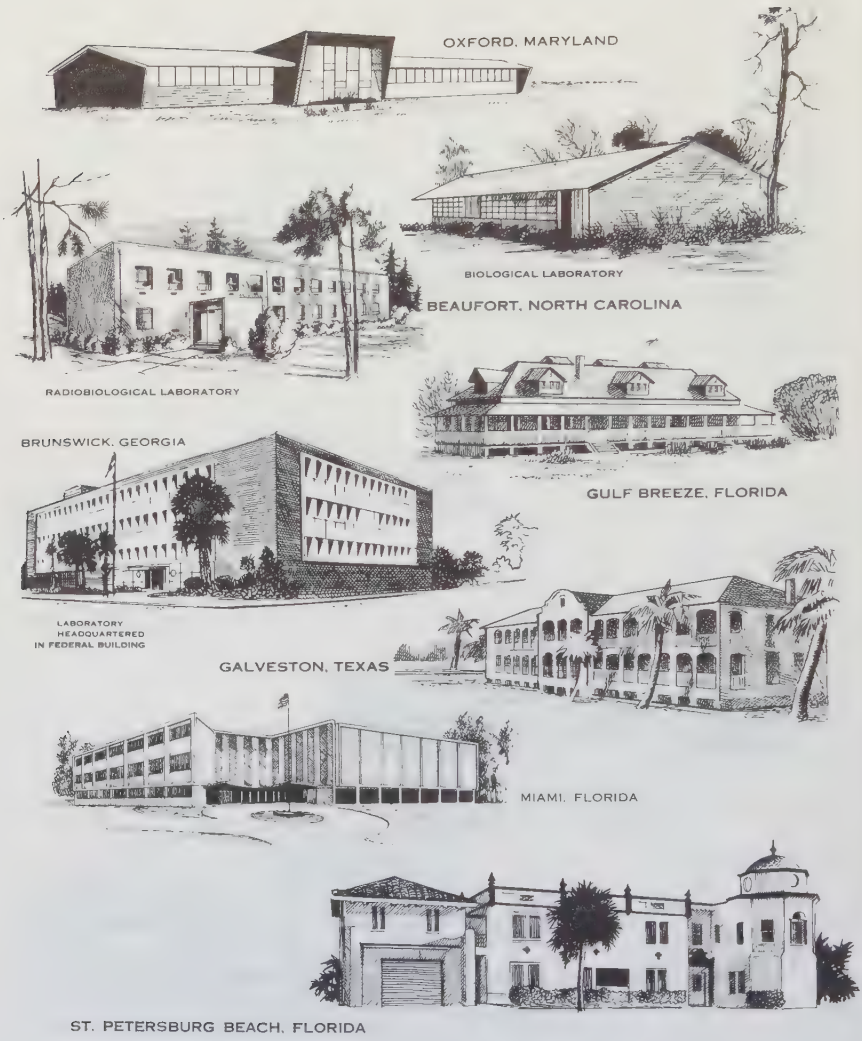


FIGURE 6.—Bureau of Commercial Fisheries Biological Laboratories, Middle and South Atlantic and Gulf Coasts, 1969.

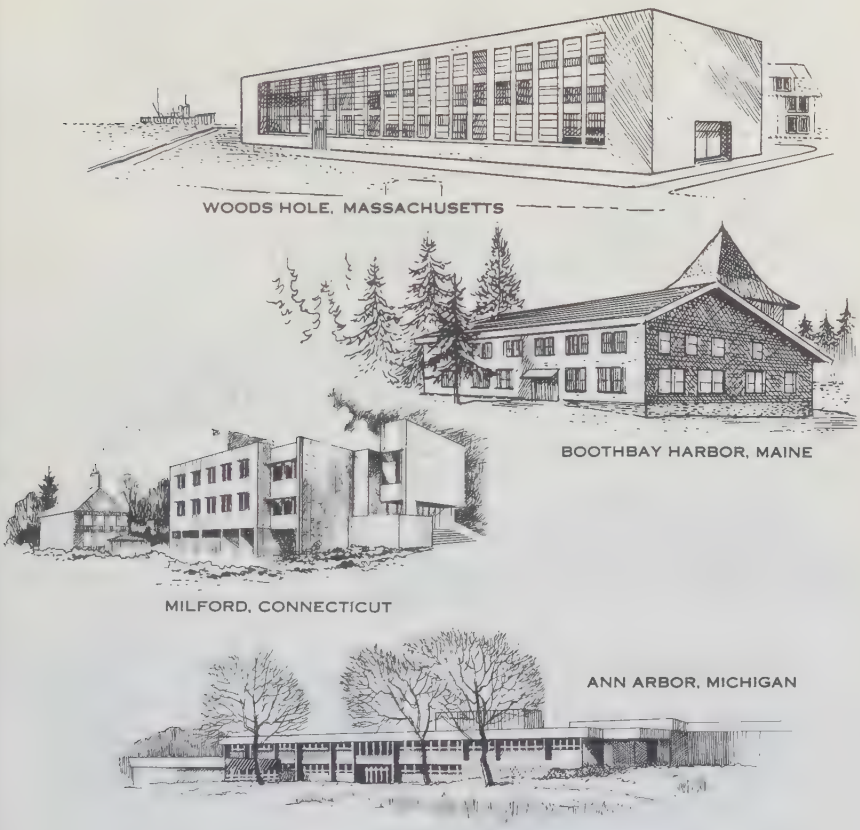


FIGURE 7.—Bureau of Commercial Fisheries Biological Laboratories, North Atlantic and Great Lakes, 1969. The Technological Laboratory in Ann Arbor occupies part of the Biological Laboratory.

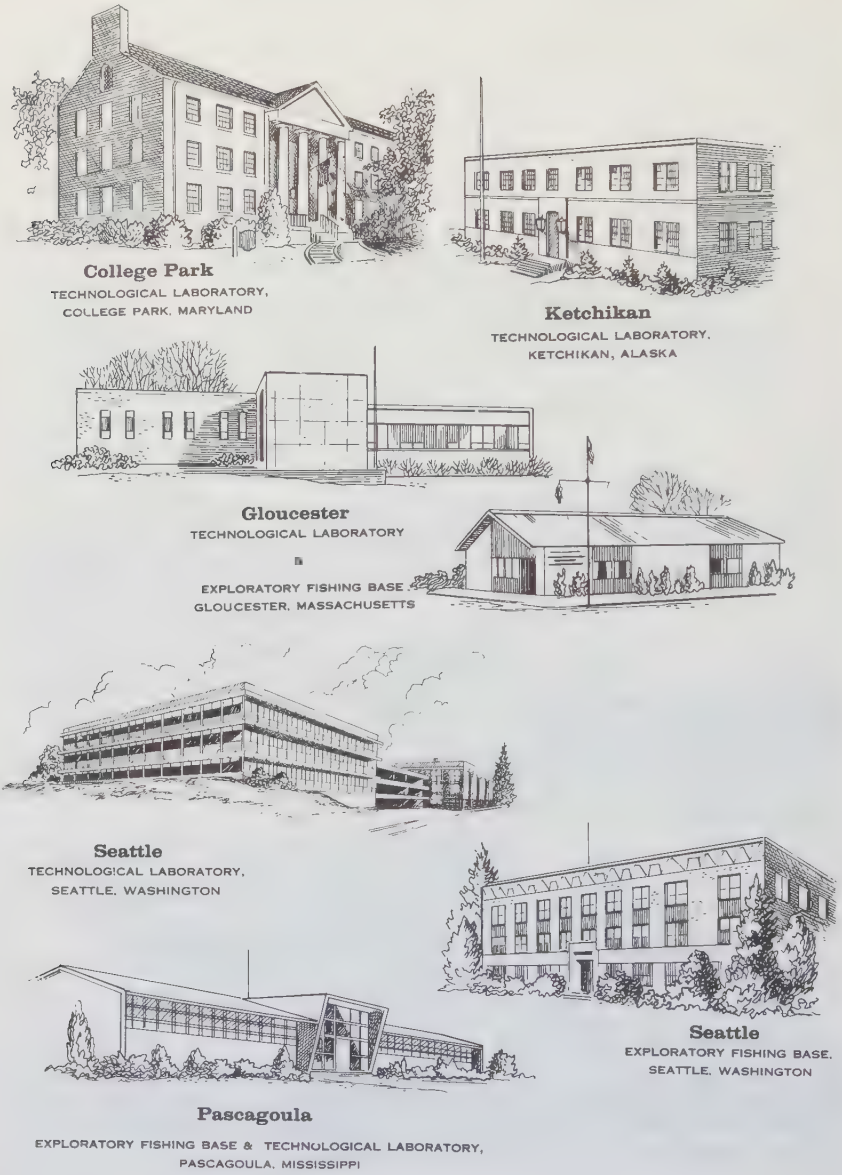


FIGURE 8.—Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Bases and Technological Laboratories, 1969. The BCF Food Science and Technological Laboratories occupy the top floor of the new building in Seattle. The Exploratory Fishing Base in Ann Arbor is in the Regional Office. The Technological Laboratory in Ann Arbor occupies part of the Biological Laboratory.

Albatross IV

Delaware II

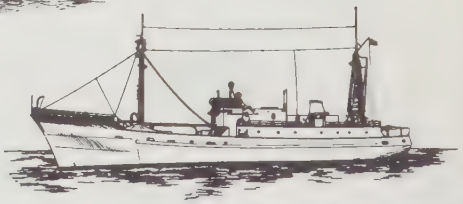
Oregon II

Undaunted

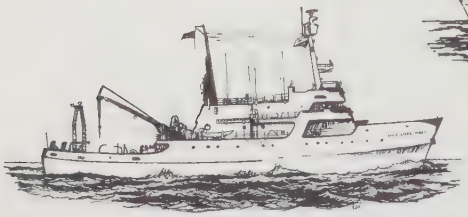
Oregon

FIGURE 9.—Bureau of Commercial Fisheries principal research vessels operating in the Atlantic in 1969.

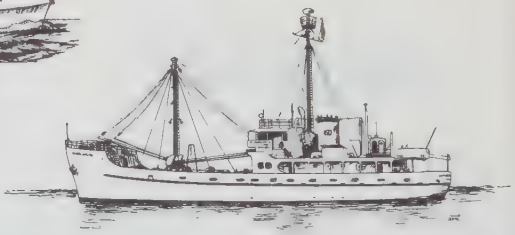
Miller Freeman



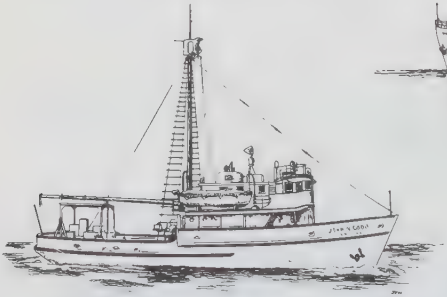
Townsend Cromwell



David Starr Jordan



George B. Kelez



John N. Cobb

Charles H. Gilbert

FIGURE 10.—Bureau of Commercial Fisheries principal research vessels operating in the Pacific in 1969.

Publications

Through its publications BCF tells the U.S. fishing industry, fishery scientists, and the general public of progress in its biological, chemical, economic, engineering, exploratory, marketing, oceanographic, and statistical activities.

These publications fall in three general categories. Fifty-two percent of the publications are contributions to scientific knowledge, particularly relating to fishery biology, fishery technology, and oceanography; 38 percent are statistical reports of interest to fishery researchers and the fishing industry; and the remaining 10 percent present popular information for the general public and nontechnical or semitechnical reports for the fishing industry.

Exclusive of the 1,648 Fishery Products Reports (5,223 pp.) which the seven Market News Service field offices issued five times a week, BCF sponsored 987 publications (12,106 pp.) in 1969. In the Fish and Wildlife Service series, 544 reports (8,040 pp.) were published. The remaining 443 publications (4,066 pp.) appear in non-Service technical and trade journals. BCF employees wrote most of the publications; employees of research institutions under contract to BCF, and unpaid collaborators wrote the others.

Not listed in the following section (app. H) or accounted for in the above statistics are those reports that were published under various Federal Aid Programs that BCF supervised or helped supervise. A complete list of such reports for 1969 is given in the annual BCF publication "Federal Aid Programs 1969."

Appendix H of this report describes the BCF series of publications and partially lists the publications issued in 1969.

APPENDIXES

Appendix A—Fisheries of the United States

A–1.—*Employment, fishing craft, and establishments, calendar years 1969 and 1968*

	1969	1968 [1]
Persons employed:	*Number*	*Number*
Fishermen	(2)	130,277
In fishery wholesaling and manufacturing establishments	(2)	88,742
Total	(2)	219,019
Craft used:		
Fishing:		
Vessels (5-net tons and over)	(2)	13,256
Motor boats	(2)	64,355
Other boats	(2)	2,028
Total	(2)	79,639
Fishing vessels, documentations issued:		
First documentations	(2)	(2)
Redocumentations	(2)	(2)
Total	(2)	(2)
Fishery shore establishments:		
Pacific Coast States	(2)	575
Atlantic Coast and Gulf States	(2)	2,774
Great Lakes and Mississippi River States	(2)	586
Hawaii	(2)	32
Total	(2)	3,967

[1] Data partially estimated.
[2] Data not available.

A–2.—*U.S. landings of certain species, calendar years 1969 and 1968 and record catch*

Species	1969 [1]		1968 [1]		Record catch	
	Million pounds	*Million dollars*	*Million pounds*	*Million dollars*	*Year*	*Million pounds*
Menhaden	1,548	23	1,375	18	1962	2,348
Tuna [2]	323	54	294	47	1950	391
Crabs, blue, dungeness, and king	235	39	238	44	1966	366
Shrimp	317	123	292	113	1969	317
Salmon	246	55	328	66	1936	644
Flounders, Atlantic and Gulf	118	16	113	14	1965	134
Haddock	46	8	71	9	1929	294
Alewives, Atlantic	63	1	57	1	1908	90
Ocean perch, Atlantic	56	2	61	2	1951	258
Whiting	46	3	79	3	1957	133
Anchovies, California	135	1	29	(3)	1969	135
Herring, sea, Atlantic	68	1	96	2	1902	201
Clam meats, Atlantic: surf, hard and soft	76	24	66	20	1969	76
Oysters, shucked	52	28	56	30	1908	152
Cod, Atlantic	58	5	49	3	1880	294
Halibut, Pacific	33	8	26	4	1915	67
Jack mackerel	52	2	57	2	1952	147
Mullet	31	3	30	3	1902	43
Hake, Pacific	9	(3)	8	(3)	1967	29
Lobster, northern	32	27	32	25	1968	32
Bonito	17	1	17	1	1967	21
Scup or porgy	12	2	15	2	1960	49
Herring, sea, Pacific	14	1	13	(1)	1937	263
Snapper, red	10	4	12	4	1902	23
Scallop meats, sea, Atlantic	10	10	12	13	1961	27
Striped bass, Atlantic	11	2	11	2	1968	11
Pollock	6	(3)	7	1	1938	41
Sea bass, black, Atlantic	4	1	4	1	1952	22
Mackerel, Pacific	2	(3)	2	(3)	1935	146
Sardine, Pacific	(3)	(3)	(3)	(3)	1936	1,502
Other	662	75	666	42	----	----
Total	4,292	519	4,116	472	----	----

[1] Preliminary.
[2] Does not include landings of tuna by U.S. vessels in Puerto Rico.
[3] Less than 500,000 pounds or $500,000.
[4] First year in which an oyster survey was made.

A–3.—*Summary of processed fishery products, by quantity and value, calendar years 1969 and 1968*

Item	1969 [1]		1968	
	Quantity	Value	Quantity	Value
	Thousand pounds	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Packaged products, fresh and frozen:				
Fish:				
Not breaded:				
Fillets and steaks, raw:				
Flounders	46,184	24,938	43,384	20,478
Groundfish, including ocean perch	47,279	21,851	55,349	21,458
Halibut	8,032	5,613	6,141	3,462
Other (including whale meat for animal feeding)	80,119	22,100	84,614	22,828
Total	181,614	74,502	189,488	68,226
Breaded, raw and cooked:				
Sticks	113,338	51,225	91,695	41,454
Fillets, portions and steaks	233,016	93,400	196,168	76,962
Shellfish:				
Not breaded:				
Shrimp	144,500	179,000	137,035	165,877
Other	157,800	165,708	135,846	143,361
Total	302,300	344,708	272,881	309,238
Breaded:				
Shrimp	104,632	110,540	102,964	101,681
Other	27,964	15,660	20,721	11,591
Total	132,596	126,200	123,685	113,272
Specialties, fish and shellfish	139,116	59,820	149,851	63,485
Total fresh and frozen	1,101,980	749,855	1,023,768	672,637
Canned:				
Fish and shellfish for human consumption:				
Tuna	396,048	297,456	395,957	268,731
Salmon	120,948	97,226	165,490	118,015
Sardines:				
Maine	24,402	11,531	40,489	19,297
Pacific	[2]	[2]	[2]	[2]
Mackerel	17,354	3,317	22,294	4,098
Clam products and specialties	67,575	23,361	66,153	21,912
Shrimp and specialties	20,279	28,384	20,151	29,889
Oyster and specialties	10,127	5,133	14,468	9,265
Squid	10,909	1,151	16,891	1,734
Other	40,924	30,718	40,209	26,346
Total for human consumption	708,566	498,277	782,102	499,287
Bait and animal food:				
Animal food	451,575	80,679	484,244	82,505
Salmon eggs for bait	620	1,856	679	2,116
Total bait and animal food	452,195	82,535	484,923	84,621
Total canned	1,160,761	580,812	1,267,025	583,908
Cured fish and shellfish:				
Salted	29,862	20,306	36,216	24,534
Smoked	24,572	28,518	29,833	35,630
Dried	866	3,176	1,137	3,043
Total cured	55,300	52,000	67,186	63,207
Industrial products:				
Meal and scrap	505,128	39,809	470,272	30,261
Oil, body and liver	169,782	9,325	174,072	7,327
Fish solubles	163,384	4,123	143,666	3,707
Oyster shell lime and poultry grit	414,664	3,329	479,596	3,572
Marine pearl shell and mussel shell buttons	[3] 411	857	[3] 453	1,078
Other		27,156		24,182
Total industrial products		84,599		70,127
Grand total		1,467,266		1,339,879

[1] Preliminary.
[2] Included with other canned.

A–4.—*Foreign trade in fishery products, by quantity and value, calendar years 1969 and 1968*

Item	1969		1968	
	Quantity	Value	Quantity	Value
	Thousand pounds	*Thousand dollars*	*Thousand pounds*	*Thousand dollars*
Imports:				
Edible:				
Fresh or frozen:				
Fresh-water (not fillets)	24,424	10,485	27,156	10,794
Salt-water (not fillets)	585,402	103,146	659,928	100,251
Groundfish and ocean perch fillets	426,728	107,848	390,236	92,375
Other fillets	120,434	53,289	109,163	44,060
Shrimp	190,158	172,114	184,798	158,228
Lobsters:				
Common	17,447	18,381	16,753	16,388
Spiny	44,992	94,327	43,062	82,648
Scallops	14,322	14,654	14,581	15,709
Other shellfish	11,144	8,868	12,015	7,153
Canned:				
Anchovies	5,444	5,326	6,036	4,820
Bonito and yellowtail	718	302	893	321
Salmon	2,217	1,376	4,955	2,820
Sardines	45,367	16,261	58,867	18,787
Tuna	73,116	37,067	67,173	31,681
Crab meat	3,436	6,196	4,720	5,373
Lobsters	2,771	8,141	2,664	6,587
Oysters and oyster juice	16,720	6,373	14,499	5,640
Other	52,711	23,018	50,454	20,905
Cured:				
Dried, pickled, or salted:				
Cod, haddock, hake, pollock, and cusk	38,772	10,990	40,350	11,638
Herring	19,312	2,897	21,085	3,068
Other	2,155	970	2,626	1,251
Smoked or kippered	3,129	984	4,306	1,289
Other	5,652	1,796	5,045	1,379
Total edible	1,706,571	704,809	1,741,365	643,165
Nonedible:				
Fish and marine animal oils	[1] 6,949	3,964	[1] 8,659	4,485
Fish meal and scrap	[2] 358	41,297	[2] 855	82,517
Fish solubles	([3])	46	2	176
Other		94,177		92,326
Total nonedible		139,484		179,504
Grand total imports		844,293		822,669
Exports of domestic products:				
Edible:				
Fresh or frozen	89,388	52,259	50,323	29,539
Canned:				
Mackerel	174	35	305	66
Salmon	15,536	11,565	5,726	4,604
Sardines	2,095	901	3,033	1,314
Shrimp	5,682	5,753	4,467	4,758
Squid	12,216	1,500	11,955	1,418
Other	8,746	7,386	7,990	6,775
Total canned	44,449	27,140	33,476	18,935
Cured	6,809	7,075	7,009	8,371
Total edible	140,646	86,474	90,808	56,845
Nonedible:				
Fish and marine animal oils	196,073	11,048	65,129	2,700
Other		7,011		8,212
Total nonedible		18,059		10,912
Grand total exports		104,533		67,757

[1] In thousand gallons.
[2] In thousand tons.
[3] Less than 1,000 tons.

Appendix B—New Legislation

Importation and Transportation of Fish (The Black Bass Act)
16 U.S.C. 851

Prohibits the importation and transportation of black bass or other fish that has been taken in violation of State, Federal or foreign laws and regulations. Amendment added the prohibition of importing any black bass or other fish from a foreign country when that fish was taken in violation of the laws of that foreign country. Enforcement authority is vested in the Secretary of the Interior.

83 Stat. 275; Public Law 91–135; Act of December 5, 1969.

Importation and Transportation of Wildlife (The Lacey Act)
18 U.S.C. 41

Provides for Federal control over taking fish and wildlife on Federal wildlife refuges; importing into the U.S. of injurious species of fish and wildlife; transporting wildlife taken in violation of State, Federal, or foreign laws and regulations; and other activities involved in packaging and shipping wildlife in the U.S. This act prohibits the importation and transportation of mollusks and Crustacea along with other kinds of illegally taken wildlife. Enforcement authority is vested in the Secretary of the Interior.

83 Stat. 275; Public Law 91–135; Act of December 5, 1969.

Appendix C—Fisheries Financial Assistance Programs

Fisheries Loan Program

C–1.—*Status of fisheries loan fund, June 30, 1969*

Funds appropriated		$13,000,000
Principal collected	$15,900,000	
Interest collected and accrued	3,352,000	
Total collected		19,252,000
Total		32,252,000
All expenses to end of fiscal year 1969	4,693,619	
Net loans approved	26,034,572	
Total		30,728,191
Balance		1,523,809

C–2.—*Cumulative totals, fiscal years 1968 and 1969, and totals, fiscal year 1969*

	Cumulative total				Total fiscal year 1969	
	As of June 30, 1968		As of June 30, 1969			
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
Applications received	2,114	57,264,231	2,259	62,783,447	145	5,519,216
Applications approved	1,116	26,593,756	1,187	29,002,714	71	2,408,958
Applications declined	518	12,056,658	545	13,151,100	27	1,094,342
Applications ineligible	139	3,642,972	140	3,707,972	1	65,000
Being processed	13	980,933	25	923,572		

C–3.—*Cumulative totals, fiscal years 1968 and 1969, and totals, fiscal year 1969*

Region	Cumulative total				Total fiscal year 1969	
	As of June 30, 1968		As of June 30, 1969			
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
Northeast:						
Applications received	440	13,817,233	472	15,122,244	32	1,305,011
Applications approved	229	6,050,932	248	6,840,493	19	789,561
California:						
Applications received	289	15,773,449	304	16,590,211	15	816,762
Applications approved	178	7,282,283	185	7,492,045	7	209,762
Gulf and South Atlantic:						
Applications received	411	10,867,948	444	12,519,570	33	1,651,622
Applications approved	154	4,197,262	164	4,977,314	10	760,052
Pacific Northwest:						
Applications received	437	9,330,588	469	10,300,584	32	969,996
Applications approved	263	5,525,575	282	5,910,258	19	384,683
Alaska:						
Applications received	462	6,503,011	494	7,264,036	32	761,025
Applications approved	261	3,187,916	276	3,418,016	15	230,100
Great Lakes:						
Applications received	50	540,332	50	540,332	0	0
Applications approved	15	142,920	15	142,920	0	0
Hawaii:						
Applications received	24	429,670	25	444,470	1	14,800
Applications approved	15	205,068	16	219,868	1	14,800
Puerto Rico:						
Applications received	1	2,000	1	2,000	0	0
Applications approved	1	1,800	1	1,800	0	0

C–4.—*Authorized use of loan proceeds, percentage by area*

[From beginning of program through fiscal year 1969]

Region	Debt payment	Improvements	Other
New England and Middle Atlantic	43	56	01
South Atlantic and Gulf	53	46	01
California	39	59	02
Pacific Northwest	38	61	01
Great Lakes	38	62	0
Alaska	25	75	0
Hawaii and Puerto Rico	43	53	04
Total	41	58	01

C–5.—*Loan applications received monthly, fiscal years 1957–69*

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
						Number							
July		17	9	15	8	19	6	5	13	4	10	8	5
August		17	12	13	10	16	7	2	10	10	12	9	8
September		14	10	9	7	16	11	21	22	14	12	16	6
October		12	7	16	6	14	13	14	21	16	28	17	19
November		18	13	9	19	26	7	16	14	22	22	18	11
December	88	11	13	15	21	14	8	15	15	18	19	15	14
January	16	14	10	16	18	29	5	12	12	31	18	8	16
February	41	18	12	27	26	19	12	13	8	19	4	15	17
March	40	22	15	28	13	19	11	18	12	14	7	10	9
April	22	22	14	13	18	16	12	48	13	11	6	13	12
May	28	11	10	19	31	9	2	36	10	16	3	6	14
June	30	9	12	10	7	11	5	19	7	11	4	4	14
Total	265	185	137	190	184	208	99	219	157	186	145	139	145

C–6.—*Amounts applied for monthly, fiscal years 1957–69*

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
July		$274,524	$251,571	$830,182	$134,196	$532,305	$141,780	$136,794	$346,404	$34,900	$462,852	$322,233	$222,525
August		931,110	363,000	234,465	275,972	297,614	223,021	11,718	213,015	223,249	566,800	317,585	196,740
September		607,851	385,517	465,610	176,781	438,773	117,243	233,864	544,554	150,752	809,886	1,269,709	142,500
October		204,635	62,532	305,150	195,095	145,443	132,107	243,298	199,273	177,585	640,425	580,446	1,001,011
November		375,583	183,559	124,905	428,011	296,877	144,267	296,669	256,687	341,360	518,516	376,328	302,838
December	$2,533,020	160,670	331,502	198,161	425,076	182,876	275,415	350,103	265,783	408,475	573,990	495,363	349,734
January	377,485	520,323	153,501	344,197	203,752	907,519	68,100	1,087,030	272,845	707,009	559,771	281,450	315,981
February	1,458,748	305,318	115,000	554,425	665,798	195,612	111,670	1,001,800	48,970	529,390	51,037	407,480	648,415
March	2,563,703	862,325	185,069	698,063	692,766	390,959	119,470	194,515	138,085	388,197	229,128	340,109	867,000
April	629,131	336,888	189,871	226,542	426,453	321,438	102,661	830,592	124,500	163,115	338,913	974,852	285,551
May	2,276,774	642,025	185,869	1,003,874	877,990	86,911	23,000	569,175	247,657	374,893	119,899	182,672	463,499
June	948,437	224,652	291,980	343,372	216,160	262,927	132,444	285,097	236,165	225,600	320,068	66,000	723,422
Total	10,787,298	5,445,904	2,668,971	5,328,946	4,718,050	4,059,254	1,591,178	5,240,655	2,893,938	3,724,525	5,191,285	5,614,227	5,519,216

Fishermen's Protective Fund Program

C–7.—*Fishermen's Protective Fund as of June 30, 1969*

	Guarantee Agreements effected	Fees collected	Claims filed	Claims paid
	Number	*Dollars*	*Number*	*Number*
California	42	67,869.60	0	0
Gulf and South Atlantic	2	655.20	0	0
Pacific Northwest	1	1,758.00	1	0
	45	70,282.80	1	0

Fishing Vessel Construction Differential Subsidy Program

C–8.—*Contracts executed each fiscal year*

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968		Fiscal year 1969		Cumulative totals	
	Number	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*	*Number*	*Dollars*
New England	1	155,613	7	1,091,153	8	6,766,937	1	458,510	1	58,425	18	8,530,638
California					2	1,705,600	6	5,203,479	3	2,403,372	11	9,312,451
Gulf												
Pacific Northwest					1	217,585			2	544,074	3	761,659
Alaska												
Total	1	155,613	7	1,091,153	11	8,690,122	7	5,661,989	6	3,005,871	32	18,604,748

Fishing Vessel Mortgage and Loan Insurance Program

C–9.—*Cumulative totals, fiscal years 1961 through 1969–totals, fiscal year 1969*

Region	Cumulative totals									
	As of June 30, 1961		As of June 30, 1962		As of June 30, 1963		As of June 30, 1964		As of June 30, 1965	
	No.	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*
Northeast:										
Applications received	3	160,000	9	804,500	11	1,054,500	11	1,054,500	13	1,464,500
Applications approved	2	120,000	4	231,250	8	775,365	8	775,365	9	1,034,928
California:										
Applications received			1	557,000	1	557,000	1	557,000	2	1,262,000
Applications approved			1	557,000	1	557,000	1	557,000	2	1,262,000
Gulf and South Atlantic:										
Applications received	2	56,500	3	95,060	13	458,740	33	1,384,090	49	2,806,646
Applications approved	1	34,500	3	95,060	10	253,504	31	965,119	43	1,962,969
Pacific Northwest:										
Applications received	2	425,000	4	848,000	6	1,827,500	7	1,846,250	8	1,861,250
Applications approved	1	75,000	3	488,046	4	507,546	5	526,296	5	526,296
Alaska:										
Applications received							3	54,774	5	75,596
Applications approved							3	54,774	4	64,774

C–9.—*Cumulative totals, fiscal years 1961 through 1969–totals, fiscal year 1969*—Continued

Region	Cumulative totals									
	As of June 30, 1966		As of June 30, 1967		As of June 30, 1968		As of June 30, 1969		Total fiscal year 1969	
	No.	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*	*No.*	*Dollars*
NE:										
Appl. rec	15	1,796,750	22	2,932,330	22	2,932,330	23	3,332,330	1	400,000
Appl. appr	11	1,367,178	15	1,916,678	16	2,271,678	16	2,271,678		
Calif.:										
Appl. rec	2	1,262,000	12	8,239,375	12	8,239,375	16	13,499,950	4	5,260,575
Appl. appr	2	1,262,000	10	7,550,825	11	8,641,825	13	10,793,425	2	2,151,600
Gulf and S. Atl.:										
Appl. rec	85	4,816,524	111	6,196,092	160	9,811,010	173	10,756,476	13	945,466
Appl. appr	66	3,092,169	94	4,584,259	134	7,432,410	149	8,578,991	15	1,146,581
Pac. NW:										
Appl. rec	13	2,127,375	15	2,558,625	17	3,038,625	20	3,733,625	3	695,000
Appl. appr	8	635,535	8	635,535	12	1,550,692	14	2,050,192	2	499,500
Alaska:										
Appl. rec	7	375,596	7	375,596	7	375,596	8	515,596	1	140,000
Appl. appr	6	364,774	6	364,774	6	364,774	7	504,542	1	139,768

Appendix D—American Fisheries Advisory Committee Membership, 1969

[Authorized by Act of July 1, 1954 (68 Stat. 376)]

Chairman: LESLIE L. GLASGOW, *Assistant Secretary of the Interior for Fish and Wildlife, Parks, and Marine Resources*

Harry Heber Bell
Harry H. Bell & Sons, Inc.,
2001 Pass-a-Grille Way,
St. Petersburg Beach, Fla. 33706

Samuel H. Bloom
Crocker & Winsor,
23 Fish Pier,
Boston, Mass. 02210

Gerald I. Bolda
Bolda Fisheries Inc.,
2310 North Richards Street,
Milwaukee, Wis. 53212

Lawrence I. Clarke
Atlantic Processing Co.
Drawer 248,
Amagansett, Long Island, N.Y. 11930

Clifton D. Day, Manager
Sea Food Division,
Del Monte Corp.,
215 Fremont Street,
San Francisco, Calif. 94119

Ammon G. Dunton
Dunton, McLeod & Simmons,
White Stone, Va. 22578

Jacob Dykstra, President
Point Judith Fishermen's
Cooperative Association,
Point Judith, R.I. 02882

Arthur H. Frohman
L. H. Frohman & Sons, Inc.,
510 North Dearborn Street,
Chicago, Ill. 60610

Jack Gorby
Food Division,
Westgate-California Corp.,
1995 Bay Front Street,
San Diego, Calif. 92101

Sigfryed Jaeger
12519 Corliss North,
Seattle, Wash. 98133

Thomas D. McGinnes, President
Virginia Seafoods, Inc.,
Irvington, Va. 22480

John Mehos
Liberty Corporations,
P.O. Box 267,
7th & Wharf,
Galveston, Tex. 77551

Roy Prewitt
American Fish Farmers Federation
P.O. Box 191,
Lonoke, Ark. 72086

Ralph A. Richards
A. A. Richards & Co., Inc.,
Alabama State Docks,
P.O. Box 318,
Mobile, Ala. 36601

W. A. Ritter, President
Pan-Alaska Fisheries, Inc.,
1818 Westlake North,
Seattle, Wash. 98109

John J. Royal, Secretary-Treasurer
Fishermen & Allied Workers' Union,
Local 33, I.L.W.U.,
806 South Palos Verdes Street,
San Pedro, Calif. 90731

Arthur O. Salasnek
Salasnek Fisheries, Inc.,
2140–80 Wilkins Street,
Detroit, Mich. 48207

John Salvador
S. Salvador & Sons Co.,
P.O. Box 462,
158 King Street,
St. Augustine, Fla. 32084

Theodore H. Shepard
Schulman-Shepard, Inc.
944 International Trade Mart,
New Orleans, La. 70130

W. O. Smith
3104 Tongass Avenue,
Ketchikan, Alaska 99901

Rupert R. Bonner, Executive Secretary
Bureau of Commercial Fisheries

Appendix E—Organizations With Which the Bureau Had Research and Development Contracts and Grants in 1969

Organization	*Principal Location*
Alabama Department of Conservation	Montgomery, Ala.
Alabama, University of	University, Ala.
Alaska Department of Fish and Game	Juneau, Alaska
Alaska, University of	College, Alaska
American Samoa	Pago Pago, American Samoa
Arizona Game and Fish Department	Phoenix, Ariz.
Arkansas Game and Fish Commission	Little Rock, Ark.
Akron, University of	Akron, Ohio
Auburn University	Auburn, Ala.
Bears Bluff Laboratories	Wadmalaw Island, S.C.
California Academy of Sciences	San Francisco, Calif.
California Department of Fish and Game	Sacramento, Calif.
California, University of	Berkeley, Calif.
California, Southern, University of	Los Angeles, Calif.
Colorado Game, Fish and Parks Department	Denver, Colo.
Columbia University	Palisades, N.Y.
Connecticut Board of Fisheries and Game	Hartford, Conn.
Cornell University	Ithica, N.Y.
Delaware Board of Game and Fish Commissioners	Dover, Del.
Delaware Commission of Shell Fisheries	Dover, Del.
Delaware, University of	Newark, N.J.
Essex Marine Laboratory, Inc.	Essex, Conn.
Esso Research and Engineering Co.	Linden, N.J.
Florida Board of Conservation	Tallahassee, Fla.
Florida State University	Tallahassee, Fla.
Florida, West, University of	Pensacola, Fla.
FMC Corporation	Santa Clara, Calif.
Food Chemical and Research Laboratory, Inc.	Seattle, Wash.
Georgetown University	Washington, D.C.
Georgia State Game and Fish Commission	Atlanta, Ga.
Georgia, University of	Athens, Ga.
Guam Division of Fish and Wildlife	Agana, Guam
Gulf Coast Research Laboratory	Ocean Springs, Miss.
Harvard University	Cambridge, Mass.
Hawaii Department of Land and Natural Resources	Honolulu, Hawaii
Hawaii, University of	Honolulu, Hawaii
Humboldt State College	Arcate, Calif.
Idaho Department of Fish and Game	Boise, Idaho

Organization	*Principal Location*
Illinois Department of Conservation	Springfield, Ill.
Indiana Division of Fish and Game	Indianapolis, Ind.
Iowa State Conservation Commission	Des Moines, Iowa
Iowa State University	Ames, Iowa
Kansas Forestry, Fish and Game Commission	Pratt, Kans.
Kansas State University	Manhattan, Kans.
Kentucky Department of Fish and Wildlife Resources	Frankfort, Ky.
Long Beach State College	Long Beach, Calif.
Long Island University	Brooklyn, N.Y.
Louisiana State University	Baton Rouge, La.
Louisiana Wildlife and Fisheries Commission	New Orleans, La.
Maine Department of Sea and Shore Fisheries	Augusta, Maine
Maryland Department of Chesapeake Bay Affairs	Annapolis, Md.
Maryland, University of	College Park, Md.
Massachusetts Department of Natural Resources	Boston, Mass.
Massachusetts Institute of Technology	Cambridge, Mass.
Miami, University of	Miami, Fla.
Michigan Department of Natural Resources	Lansing, Mich.
Michigan State University	East Lansing, Mich.
Michigan, University of	Ann Arbor, Mich.
Minnesota Department of Conservation	St. Paul, Minn.
Mississippi Marine Conservation Commission	Biloxi, Miss.
Mississippi State University	State College, Miss.
Missouri Department of Conservation	Jefferson City, Mo.
Montana Fish and Game Department	Helena, Mont.
National Science Foundation	Washington, D.C.
Nebraska Game, Forestation and Park Commission	Lincoln, Nebr.
Nevada Fish and Game Commission	Reno, Nev.
New Hampshire Fish and Game Commission	Concord, N.H.
New Jersey Department of Conservation	Trenton, N.J.
New Mexico State Game Commission	Santa Fe, N. Mex.
New York Department of Conservation	Albany, N.Y.
North Carolina Department of Conservation and Development	Raleigh, N.C.
North Carolina State University	Raleigh, N.C.
North Carolina, University of	Chapel Hill, N. C.
North Dakota Game and Fish Department	Bismarck, N. Dak.
Ocean Harvester, Inc.	Los Angeles, Calif.
Ohio Division of Wildlife	Columbus, Ohio
Ohio Geological Survey	Columbus, Ohio
Ohio State University	Columbus, Ohio
Oklahoma Department of Wildlife Conservation	Oklahoma City, Okla.
Oklahoma State University	Stillwater, Okla.
Oregon State Fish Commission	Portland, Oreg.
Oregon State University	Corvallis, Oreg.

Organization	*Principal Location*
Oregon, University of	Eugene, Oreg.
Pacific Salmon Inter-Agency Council	Portland, Oreg.
Pennsylvania Fish Commission	Harrisburg, Pa.
Puerto Rico Department of Agriculture	San Juan, P.R.
Rhode Island Department of Natural Resources	Providence, R.I.
Rhode Island, University of	Kingston, R.I.
Rutgers University	New Brunswick, N.J.
South Carolina Department of Wildlife Resources	Wadmalaw Island, S.C.
South Dakota Department of Fish, Game and Parks	Pierre, S. Dak.
Stanford Research Institute	Menlo Parks, Calif.
Tennessee Game and Fish Commission	Nashville, Tenn.
Texas Department of Parks and Wildlife	Austin, Tex.
Texas, University of	Austin, Tex.
Trenton State College	Trenton, N.J.
Utah State Department of Fish and Game	Salt Lake City, Utah
Vermont Fish and Game Department	Montpelier, Vt.
Virgin Islands, Office of the Governor	St. Thomas, V.I.
Virginia Commission of Fisheries	Newport News, Va.
Virginia Institute of Marine Science	Gloucester Point, Va.
Virginia Polytechnic Institute	Blacksburg, Va.
Washington Department of Fisheries	Olympia, Wash.
Washington State University	Pullman, Wash.
Washington, University of	Seattle, Wash.
West Virginia Department of Natural Resources	Charleston, W. Va.
Wisconsin Department of Conservation	Madison, Wis.
Wisconsin, University of	Madison, Wis.
Woods Hole Oceanographic Institution	Woods Hole, Mass.
Wyoming Game and Fish Commission	Cheyenne, Wyo.
Yale University	New Haven, Conn.

Appendix F—Budget for Fiscal Year 1970—Obligational Program

[In thousands of dollars]

Function	Appropriations												Other funds		Total
	Management and investigations of resources	Special foreign currency program	Construction	Construction of fishing vessels	Federal aid research and development	Anadromous and Great Lakes	Payment to Alaska	Administration of Pribilof Islands	Fishery promotion and development	General administrative expenses	Fishermen's protective fund	Fishery loan fund	Trust funds	Reimbursements	
Management	626														626
Marketing and technology	8,432	77							3,392				800	540	13,241
Research	14,473	66							4,301				946	1,421	21,207
Research on fish migration over dams	1,510													52	1,562
Fishing vessel mortgage insurance	59														59
Columbia River fishery facilities	3,035		1,635											279	4,949
Construction of fishery facilities			1,476												1,476
Construction of fishing vessels				4,865											4,865
General administrative services									520	896					1,416
Aid to States and other cooperators					6,100	2,318									8,418
Administration of Pribilof Islands								2,464						40	2,504
Fur seal research								304							304
Payment to Alaska from Pribilof Islands receipts							307								307
Fishermen's Protective Program											135				135
Loans to fisheries												3,580			3,580
Total	28,135	143	3,111	4,865	6,100	2,318	307	2,768	8,213	896	135	3,580	1,746	2,332	64,649

Appendix G—Physical Properties

G–1.—*Principal laboratories and installations, calendar year 1969*

Location	Type	Principal use	Gross valuation [1]
Alaska:			
Auke Bay	Biological Laboratory	Biological research	$436,000
Gibson Cove	Laboratory, office, and warehouse.	Enforcement and surveillance, technology and biological field stations, and exploratory fishing and gear research.	398,175
Juneau	Exploratory Fishing and Gear Research Base, warehouse, and shops.	Exploratory fishing and gear research, vessel maintenance.	[2] 768,436
Ketchikan	Technological Laboratory	Technological research	195,000
Pribilof Islands	Fur seal processing facilities and native villages.	Management of Alaska fur seals	4,546,366
California, La Jolla	Fishery-Oceanography Center	Biological research	2,600,000
Connecticut, Milford	Biological Laboratory	----do	1,316,400
District of Columbia, U.S. National Museum.	Systematics Laboratory	----do	[3]
Florida:			
Gulf Breeze	Biological Laboratory	----do	62,000
Miami	----do	Biological research, statistics, and market news reporting.	1,545,000
St. Petersburg Beach	----do	Biological research	25,969
Hawaii, Honolulu	----do	Biological research, loans and grants, statistics.	1,250,000
Maine, Boothbay Harbor	----do	Biological research	289,015
Maryland:			
Beltsville	Processing Plant	Processing of fish protein concentrate.	[4]
College Park	Technological Laboratory	Technological research, home economics.	[5] 134,110
Oxford	Biological Laboratory	Biological research	207,000
Massachusetts:			
Gloucester	Technological Laboratory	Technological research, fishery products inspection.	367,680
Do	Marine Products Irradiator	Research on irradiation of fishery products.	[4]
Do	Exploratory Fishing and Gear Research Base.	Exploratory fishing and gear research.	65,000
Woods Hole	Biological Laboratory	Biological research	1,029,000
Michigan, Ann Arbor	Biological Laboratory, Technological Laboratory, Exploratory Fishing and Gear Research Base, Marketing Office.	Biological research, technological research, statistics, exploratory fishing and gear research, market development.	[5] 1,441,173
Mississippi, Pascagoula	Exploratory Fishing and Gear Research Base, Technological Laboratory, Marketing Office.	Exploratory fishing and gear research, market development, biological and technological research, market development.	415,453
North Carolina, Beaufort	Biological Laboratory, Statistics Office, and Radiobiological Laboratory.	Biological research, statistics, and research in radiobiology.	614,694
Oregon, Portland	Columbia River Fisheries Program Office.	Columbia River fisheries development.	[4]
Texas, Galveston	Biological Laboratory and Statistics Office.	Biological research and statistics.	370,403
Washington, Seattle	Biological Laboratory, Technological Laboratory, Exploratory Fishing and Gear Research Base, Pioneer Laboratory, Marketing, dock and warehouse.	Biological, technological, and food science research, exploratory fishing and gear research, Pribilof Islands supply, fishery products inspection, market development.	[2] 2,295,553

[1] Figures represent original acquisition or construction costs for owned property only.
[2] Installations at this location are both owned and leased by Bureau of Commercial Fisheries.
[3] Installation not owned by Bureau of Commercial Fisheries. Includes property held under leases, cooperative agreements, and use permits.
[4] Retained by Bureau of Commercial Fisheries under agreement pending conveying to University of Maryland pursuant to Public Law 89–227.
[5] Owned by Atomic Energy Commission and operated by Bureau of Commercial Fisheries.

G–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1969*

Location	Type	Principal use	Gross valuation [1]
Alabama, Bayou LaBatre.	Market News and Statistical Field Office.	Market news and statistics	[2]
Alaska:			
Brooks Lake	Field, Research Station	Biological research	44,000
Juneau	Statistical Office	Statistics	[3]
Karluk Lake	Field Research Station	Biological research	27,000
Kasitsna Bay	----do	----do	12,000
Little Port Walter	----do	----do	158,000
Olsen Bay	----do	----do	7,000
St. Paul Island	----do	----do	[4]
Traitors Cove	----do	----do	8,000
Arkansas:			
Kelso	Exploratory Fishing and Gear Research Station.	Exploratory fishing and gear research.	[2]
Little Rock	Marketing Office	Marketing	[2]
California:			
Los Angeles	Inspection Office	Inspection	[2]
San Francisco	Marketing and Inspection Office.	Marketing, inspection	[2]
Terminal Island	Marketing Office, Technological Laboratory, Market News and Statistics Office.	Technological research, fishery products inspection, market news and statistics reporting.	[2]
Florida:			
Apalachicola	Market News and Statistical Office.	Market news and statistics reporting.	[2]
Fort Myers	----do	----do	[2]
Key West	----do	----do	[2]
St. Petersburg	Fishery inspection, Federal aid, loans and grants, river basin studies, and marketing.	Fishery products inspection, Federal aid, loans and grants, river basin studies, and market development.	[2]
Tampa	Market News and Statistical Office.	Market news and statistics reporting.	[2]
Georgia:			
Atlanta	Marketing Office	Marketing development	[2]
Brunswick	Exploratory Fishing and Gear Research Station and Statistical Office	Exploratory fishing and gear research, statistics	[3]
Savannah	Statistical Office	Statistics reporting	[2]
Idaho, Boise	Field Research Station	River basin studies	[2]
Illinois:			
Chicago	Market News Office, Fishery Products Inspection Office.	Market news reporting, fishery products inspection.	[2]
Do	Marketing Office	Marketing	[2]
Louisiana:			
Golden Meadow	Statistical Office	Statistics reporting	[2]
Houma	----do	----do	[2]
Morgan City	----do	----do	[2]
New Orleans	Market News Office, Statistical Office.	----do	[2]
Maine:			
Portland	Field Office	Statistics, market news, enforcement.	[2]
Rockland	----do	----do	[2]
West Boothbay Harbor.	Statistical Office	Statistics	[2]
Maryland, Baltimore	Market News Office, marketing.	Market news reporting, marketing.	[2]
Massachusetts:			
Boston	Market News Office, marketing, loans and grants.	Market news reporting, statistics, biological and technological research, marketing, fishery loans.	[2]
Gloucester	Field Office	Statistics, biological research, fishery products inspection, enforcement.	[2]
New Bedford	----do	Statistics, biological research, market news reporting, enforcement.	[2]
Provincetown	Statistical Office	Statistics, market news reporting, enforcement.	[2]
Michigan:			
Hammond Bay	Field Research Station	Biological research	[2]
Ludington	----do	----do	[2]
Marquette	----do	----do	[2]
Minnesota, St. Paul	Marketing Office	Marketing	[2]

See footnotes at end of table.

G–2.—*Minor field research stations, market news offices, exploratory fishing stations, market development offices, and statistical offices, calendar year 1969*—Continued

Location	Type	Principal use	Gross valuation [1]
Mississippi, Ocean Springs.	Statistical Office	Statistics, market news reporting.	(2)
Missouri, St. Louis	Marketing and Inspection Offices.	Market development, fishery products inspection.	(2)
New Jersey, Toms River	Statistical Office	Statistics	(2)
New York:			
Bayport	----do	----do	(2)
New York City	Market News Office, Marketing, Fishery Products Inspection Office.	Market news reporting, marketing, fishery products inspection.	(2)
Ohio:			
Cleveland	Marketing and Inspection Office	Market development, fishery products inspection.	(2)
Sandusky	Field Research Station	Biological research	(2)
Oregon:			
Astoria	Enforcement and field research stations.	Enforcement of commercial fisheries laws and regulations and biological research.	(2)
Eugene	Field research station	River basin studies	(2)
Portland	----do	Biological research	(2)
Rhode Island:			
Point Judith	Field Station	Statistics reporting	(2)
Warren	Statistical Office	----do	(2)
South Carolina, Charleston.	----do	----do	(2)
Tennessee, Camden	----do	----do	(2)
Texas:			
Aransas Pass	Market News and Statistical Office.	----do	(2)
Brownsville	Statistical Office, Fishery Products Inspection Office.	Statistics, fishery products inspection.	(2)
Dallas	Marketing Office	Marketing	(2)
Freeport	Statistical Office	Statistics	(2)
Galveston	Market News and Statistics Offices.	Market news reporting, statistics.	(2)
Port Arthur	Statistical Office	Statistics	(2)
Virginia:			
Franklin City	Field Research Station	Biological research	(2)
Hampton	Market News Office	Market news reporting	(2)
Virginia Beach	Statistical Office	Statistics	(2)
Weems	----do	----do	(2)
Washington:			
Bellingham	Enforcement and inspection	Enforcement of commercial fisheries laws and regulations and inspection.	(2)
North Bonneville	Field Research Station	Biological research	14,000
Pasco	----do	----do	(2)
Seattle	Market News, Statistics, enforcement, loans and grants, marketing, Federal aid, and reports.	Market news and statistical reporting, fishery loans, marketing, Federal aid to States, and report publication.	(2)
Wisconsin, Ashland	Field Research Station	Biological research	(2)

[1] Figures shown are original acquisition or construction costs. Figures are not shown for the following:
[2] Installation not owned by Bureau of Commercial Fisheries. Includes property held under lease, cooperative agreements, and use permits.
[3] Installations at this location are both owned and leased by Bureau of Commercial Fisheries.
[4] Included in Pribilof Islands, appendix G–1.

G–3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1969*

Name of vessel	Home port	Length (feet)	Year built	Cost or estimated value	Main engine (horse-power)	Mission
Pribilof	Seattle, Wash	222	1953	$2,207,016	1,400	Transportation of supplies and personnel to Pribilof Islands fur seal stations.
Miller Freeman	----do	214	1967	3,387,551	2,150	High-seas salmon investigations and oceanography.
Albatross IV	Woods Hole, Mass.	187	1962	2,000,000	1,100	Fishery and biological research studies; oceanographic studies in Atlantic waters.
Geo. B. Kelez	Seattle, Wash	176	1944	929,993	1,000	High-seas salmon investigations and oceanography.
David Starr Jordan.	San Diego, Calif	171	1965	2,000,000	900	Oceanography; sardine ecology, studies on biology of other commercial species.
Oregon II	Pascagoula, Miss.	170	1967	2,000,000	1,600	Exploratory fishing.
Townsend Cromwell.	Honolulu, Hawaii.	158	1963	1,800,000	800	Pacific oceanography; tuna biology, behavior, and distribution.
Delaware II	Gloucester, Mass.	156	1968	1,400,000	1,000	Exploratory fishing and biological studies on groundfishes and sea scallops, gear research.
Undaunted	Miami, Fla	143	1944	1,000,000	1,850	Investigations of tropical Atlantic fishery.
Charles H. Gilbert.	Honolulu, Hawaii.	123	1952	400,000	500	Pacific oceanography; tuna biology, behavior, and distribution.
Oregon	Juneau, Alaska	100	1950	300,000	600	Exploratory fishing for bottomfish, sh imp, and crabs; gear research.
John N. Cobb	Seattle, Wash	93	1950	235,000	500	Exploratory fishing for pelagic and bottomfish, shrimp, and crabs; gear research.
Murre II	Juneau, Alaska	86	1943	64,000	115	Oceanographic studies in coastal waters of Southeastern Alaska with limited use for servicing shore facilities.
George M. Bowers.	Pascagoula, Miss.	73	1956	93,800	210	Gear research.
Kaho	Saugatuck, Mich.	65	1961	118,000	300	Exploratory fishing and gear research on industrial fishes, chubs, alewives, sheepshead, gizzard shad, and smelt.
Rorqual	Boothbay Harbor, Maine.	64	1941	187,000	230	Gear research and inshore exploration on herring and shellfish.
Miss Behavior	San Diego, Calif.	63	1943	120,000	760	Sonar and acoustical systems evaluation; gear research.
Cisco	Saugatuck, Mich.	60	1950	80,000	175	Research on deepwater fish species, their distribution, abundance, and ecology; limnology.
Heron	Juneau, Alaska	58	1940	19,000	135	Salmon and herring research.
Siscowet	Ashland, Wis	57	1946	95,000	147	Research on deepwater fish species, their distribution, abundance, and ecology; limnology.
Shang Wheeler	Milford, Conn	50	1951	46,000	140	Shellfish research; oyster and clam propagation; predator control.

G–3.—*Bureau of Commercial Fisheries vessel fleet, calendar year 1969*—Continued

Name of vessel	Home port	Length (feet)	Year built	Cost or estimated value	Main engine (horsepower)	Mission
Alosa	Oxford, Md	48	1941	6,500	82	Shellfish research; oyster propagation and disease studies.
Hiodon	Mobridge, S. Dak.	46	1965	24,000	190	Research on reservoir fish species.
Musky II	Sandusky, Ohio	45	1960	30,000	165	Studies on warmwater fishes of Lake Erie; limnology; pollution studies.
J–3486	Beaufort, N.C	43	1942	28,000	-----	Research on shellfish, striped bass, and other coastal species, collection of samples for radio biological studies.
Kingfish	St. Petersburg Beach, Fla.	43	1954	24,500	150	Estuarine investigations.
Phalarope II	Boothbay Harbor, Maine.	40	1932	8,000	225	Clam and herring studies.
Sockeye	King Salmon, Alaska.	40	1946	11,000	175	Salmon research work.

Appendix H—U.S. Fish and Wildlife Service Publications Series and a 1969 List of Publications by Bureau Personnel

The regular, established series of the U.S. Fish and Wildlife Service in which BCF publications appear are:

Fishery Bulletin.—Technical reports on scientific investigations of fishery biology. The Bulletin of the United States Fish Commission was begun in 1881; it became the Bulletin of the Bureau of Fisheries in 1904 and the Fishery Bulletin of the Fish and Wildlife Service in 1941. Separates were issued as documents through volume 46; the last document was No. 1103. Beginning with volume 47 in 1931 and continuing through volume 62 in 1963, each separate appeared as a numbered Bulletin. A new system began in 1963 with volume 63 in which papers are bound together in a single issue of the Bulletin instead of being issued individually. Fourteen papers (430 pp.) were published in 1969. Four papers (113 pp.) are in volume 67, No. 2, one paper (141 pp.) in volume 67, No. 3, and nine papers (176 pp.) in volume 68, No. 1. Bulletins are distributed free to libraries, research institutions, scientists, and State agencies. Some Bulletins are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Fishery Industrial Research.—Technical reports dealing with scientific investigations of fishery technology, economics, exploratory fishing, and gear research. Twenty-six papers (318 pp.) were published in 1969. Three papers (31 pp.) are in volume 4, No. 6, three papers (60 pp.) in volume 4, No. 7, four papers (37 pp.) in volume 5, No. 1, three papers (63 pp.) in volume 5, No. 2, four papers (29 pp.) in volume 5, No. 3, five papers (48 pp.) in volume 5, No. 4, and four papers (50 pp.) in volume 5, No. 5. They are distributed free to the fishing industry, libraries, scientists, and technologists.

Special Scientific Report—Fisheries.—Preliminary or progress reports and reports on scientific investigations of restricted scope. Established as Special Scientific Reports in 1940, Nos. 1 to 67 were issued from that date to 1949, when the new series, Special Scientific Report—Fisheries, with new serial numbering, was started. Fourteen of these reports (369 pp.) were published in 1969. They are distributed free to biologists, cooperators, and libraries. They also are distributed free on individual requests.

Fishery Leaflet.—Popular information on fishery subjects intended primarily for use in correspondence. Six leaflets (98 pp.) were published in 1969. They are distributed free to biologists, cooperators, and libraries. They also are distributed free on individual requests.

Circular.—Popular and semitechnical publications of general and regional interest intended to aid conservation and management. Twenty-five Circulars (915 pp.) were published in 1969. They are distributed free to biologists, cooperators, and libraries. They also are distributed free on individual requests.

Data Report.—Reports that include compilations of unanalyzed or partially analyzed data collected during biological, limnological, or oceanographic investigations. The reports were originally printed as 3- by 5-inch microfiche, each

of which has up to 40 pages of material. In June 1965, BCF began using the 4- by 6-inch size of microfiche, which holds up to 70 pages. The pages are reduced to one-eighteenth normal size; consequently, they can be read only through a microscope, microfiche "reader," or any similar device for enlarging. The Data Report series is the first Government microfiche series to be used for primary publication of scientific reports. Advantages of microfiche over regular size reports are threefold. They occupy only about one-hundredth as much space; they can be printed in a matter of weeks rather than months; and for BCF distribution lists, the cost of printing and mailing is only about one-tenth as much. Data Reports 31, 32, 33, 34, 35, 36, 37, 38, and 39 (1,154 pp., 23 microfiches) were issued in 1969. They are distributed free to a restricted mailing list of laboratories, libraries, State fishery agencies, research institutions, and research scientists. [Hard (full-size) copy is available for purchase at the U.S. Department of Commerce, Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151.]

Commercial Fisheries Abstracts.—A monthly abstract of world literature (chiefly English language) on fishery technology. Volume 22 in 1969 had 12 issues (348 pp.). They have free but limited distribution.

Commercial Fisheries Review.—A monthly periodical which features articles on BCF research and operations and trends and developments in the domestic and foreign fisheries. Volume 31 in 1969 had 11 issues (824 pp.). They are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Subscription price is $7 a year, $2 additional for foreign mailing, single copies 60 cents each. Index for volume 30 (1968) of the Commercial Fisheries Review was issued also (48 pp.).

Statistical Digest.—Annual statistics with detailed tabulations relating to fishery production, manufacture, and commerce. These succeeded the Administrative Report series. No Digest was published in 1969. Digests are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402; some are distributed free to a limited mailing list.

Current Fishery Statistics.—Current statistical information on fishery production, manufacture, and domestic or foreign trade; issued monthly, quarterly, or annually by States, regions or larger areas. In 1969, the Division of Statistics and Market News issued 306 current fishery statistical publications totaling 1,961 pages. In addition, considerable data were supplied as news releases for the Fishery Market News reports. The current fishery statistical publications are sent to private and Government industries in the United States, foreign industries, and U.S. embassies.

Fishery Products Reports.—Three times a week seven BCF Market News Service field offices mail free reports of marketing information on fisheries (not available from any other source) to brokers, fishermen, processors, retailers, wholesalers, and others in related industries. During 1969, these offices released 1,648 daily reports (5,223 pages) and published 6 annual reports and 72 monthly summaries (742 pages) and 28 supplementary reports (157 pages).

Current Economic Analysis.—Quarterly situation and outlook reports are published by the BCF Division of Current Economic Analysis covering finfish, shellfish, and industrial fishery products. Prices, production, imports, exports, and inventories of fishery products are analyzed to develop a picture of current and future market conditions. One purpose of the situation and outlook reports is to help the fishing industry make rational decisions concerning production, distribution, inventories, and pricing of fishery products. In 1969,

two issues of the Current Economic Analysis F5 and F6 (Food Fish Situation & Outlook) (134 pp.), four issues of the Current Economic Analysis I4, I5, I6, and I7 (Industrial Fishery Products Situation & Outlook) (172 pp.), and four issues of the Current Economic Analysis S12, S13, S14, and S15 (Shellfish Situation & Outlook) (136 pp.) were published. About 6,000 copies of each issue of the finfish and shellfish reports were distributed to industry and Government agencies in all 50 States and some 70 countries. About 3,500 copies of each of the four industrial fishery products situation and outlook reports were mailed to industry and Government personnel in 1969.

Fishery Market Development Series.—This series, established in 1966 to replace the Test Kitchen Series, contains popular educational publications on care, preparation, purchase, and nutrition of fishery products. These publications are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. During 1969, three publications (83 pp.) were published.

Miscellaneous paper.—One miscellaneous paper, totaling 151 pages, was issued. It is the "Report of the Bureau of Commercial Fisheries for the Calendar Year 1967." BCF's annual reports are distributed free to biologists, cooperators, and libraries on individual requests.

A detailed list of publications of BCF and its personnel or contractors or collaborators during 1969 follows. The articles are listed by authors.

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